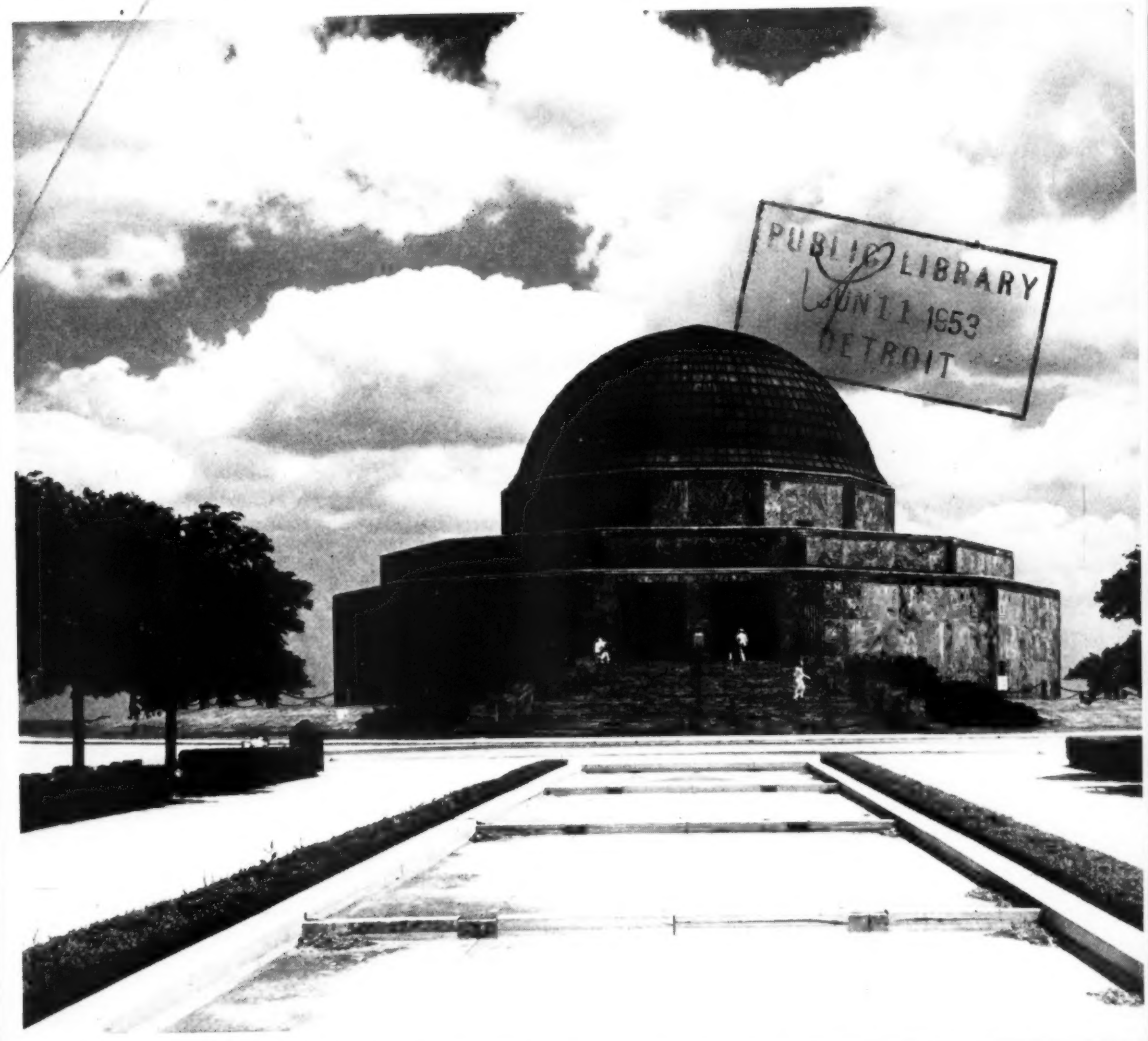
TECHNOLOGY DEPT.

Midwest Engineer

SERVING THE ENGINEERING PROFESSION



PUBLIC LIBRARY
JUN 11 1953
DETROIT

WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

ANNUAL INVENTORIES AND PRIORITIES — PAGE THREE

Vol. 6 JUNE, 1953 No. 1

R v.6 Je'53 - My'54

a good advertising medium

FOR ALERT ADVERTISERS

Midwest Engineer

because . . .

- Circulation in America's industrial and residential heart.
- The direct path to specifying, purchasing, and industrial executives—those who say yes.
- Provides coverage in all engineered industries.
- Opens a live market area for machinery, fabricated products, industrial equipment, materials of construction, parts, tools, products and services.
- The mirror of the coordination of engineering and civic interests.
- Advertising rates are extremely low for coverage of this big market.

Western Society of Engineers

84 E. Randolph Street
Chicago 1, Illinois

Tech

MIDWEST ENGINEER
Published Monthly
BY
THE WESTERN
SOCIETY OF ENGINEERS
AT
2207 DODGE AVENUE
EVANSTON, ILLINOIS

•

Charles E. DeLeuw.....*President*
John F. Sullivan, Jr.....*1st Vice-President*
Albert P. Boysen.....*2nd Vice-President*
Allan A. Bulley.....*Treasurer*
J. Earl Harrington.....*Executive Secretary*

Trustees:

G. Leland Seaton
Clifford B. Cox
Bruce A. Gordon
Robert S. Hammond
F. A. Hess
George L. Jackson
Hjalmar W. Johnson
Alf Koflat
Wm. R. Marston
Charles L. Mee
Thomas M. Niles
J. T. Rettaliata

Donald N. Becker.....*Past President*
Ovid W. Eshbach.....*Past President*
Leroy F. Bernhard.....*Chairman, Publications Committee*

J. EARL HARRINGTON
Editor and Business Manager

HAROLD K. EATON
Managing Editor

GENERAL AND EDITORIAL OFFICES
HEADQUARTERS OF
WESTERN SOCIETY OF ENGINEERS
84 E. RANDOLPH STREET
CHICAGO 1, ILLINOIS
TELEPHONE: RANDOLPH 6-1736

The Society does not assume responsibility for statements and opinions in articles, papers and discussions appearing herein. All material must be submitted on or before the 10th of the month prior to date of publication.

•

Copyright 1953 by the
WESTERN SOCIETY OF
ENGINEERS

•

Permission is given for the reproduction of any material herein, provided due credit is given.

Single Copy.....$ .50
Annual subscription..... 4.00
Foreign subscription..... 6.00

Entered as second-class matter September 23, 1948 at the post office at Evanston, Illinois under the Act of March 3, 1879.

Midwest Engineer

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

JUNE, 1953 Vol. 6, No. 1

CONTENTS

Annual Inventories and Priorities..... 3
A Century of Printing Progress..... 7
Crerar Library News.....21
Obituaries 22
Applications 23
Personals 24
ESPS Listings.....25
Book Reviews 27
Advertisers' Index.....28

Cover Story

Have you ever wondered what to do on a quiet week end or holiday afternoon? You might do what many other people in Chicago do — visit the Adler Planetarium shown on our cover. It's located at Roosevelt road and the Lake Front. This astronomical museum is the first one in the United States to actively reproduce workings of celestial orbits. The Adler Planetarium is open week days from 10 to 5; Sundays and holidays from 2 to 5.

WSE
Fourth Annual Golf Tournament

CHEVY CHASE COUNTRY CLUB
WHEELING, ILLINOIS

Saturday, August 15, 1953

All Day Outing for Your Enjoyment
Tee Off Time—9 A.M. to 1 P.M.

Deluxe Chevy Chase Dinner at 7 pm
Special Attractions
Swim in the Beautiful Outdoor Pool
Enjoy a Top Notch Play in the Chevy Chase Summer Theatre

Arrange Your Foursome or Party and Fill in the Blank Below

WSE 4th Annual Golf Tournament

NAME_____

ADDRESS_____

TELEPHONE_____

No. of Reservations:

Tee Off Time.....A.M.

Preferred .....P.M.

Golf and Dinner	$8.25	( )
Golf only	3.75	( )
Swimming Only	1.80	( )
Dinner Only	4.75	( )

Amount Enclosed _____

Make checks payable to Western Society of Engineers.
Mail to Headquarters, 84 E. Randolph Street
Chicago 1, Illinois

Tear Off— Make Your Reservation Now

For the Highway Program

Annual Inventories and Priorities

By Roy E. Jorgensen

It should be apparent that the conventional approach to our highway problem has not provided an effective solution. We can find lots of reasons for our highway situation—rising prices, increasing number of vehicles, curtailment of work during World War II, diversion of highway funds, etc.—but we find no consistent and effective answer in the current approach to the highway problem.

In many states, the engineers have developed fine comprehensive programs, aimed at modernization of the entire road and street system. These have met with a variety of dispositions. In some cases, they have been largely ignored. In others, they have been used as justification for increasing highway taxes, but without provision for revenue distribution to effect the needed highway improvements. Even under the best circumstances, where conscientious effort was made to finance a comprehensive program, we have found the program ineffective because of inflation and increasing traffic demands.

It is apparent that we need a new approach, one that will overcome the difficulties we have been experiencing. It must be clear-cut and widely understood to assure that legislative actions will fulfill the needs of the program. It must be an approach which has both flexibility and continuity. Only thus, can there be recognition of changing prices and growing or shifting traffic, as well as a consistent year-to-year scheduling of work aimed at an overall integrated highway plan.

In the present period, when we find great emphasis being placed on getting a businesslike approach to government, it may be that we can see ways for bringing business practices to give an effective solution to the highway problem. Certainly, many, if not all, of the difficulties we have been experiencing in dealing with the highway situation, exist in one form or another in business. Stockholders must be informed in simple, convincing reports. Inventories of goods must be maintained. Expansion of the plant must be directed towards getting first things first, and of fitting this year's work to a long-range plan of development. Flexibility and reappraisal, regularly, are essential in business, just as they are in the highway problem.

An Annual Inventory

Inventorying is a regular and an essential business practice. It is an activity which needs to be incorporated in the solution to our highway problem. We need to know how our road and street system stacks up against the job it has to do.

Most states have at one time or another made comprehensive inventories which evaluate and record the characteristics and condition of each road section, as well as the traffic served. But, only to a limited degree have steps been taken to establish the operation as a regular highway department function. And, it is only when inventories are made periodically that they serve their purpose fully. Then, there is obtained, not only an evaluation of the road system, but also, a determination of the trend in its condition or adequacy. Each year, it can be seen whether progress has been made in the developmnt of adequate roads. Each year, it is made clear just what effect traffic increases or cost trends are having on the program.

In the past, one of the deterrents to the year to year inventorying of our highways and streets has been the lack of accepted standards of evaluation which could be applied uniformly throughout the road system, and readily maintained from year to year. Such inventories as were made, were generally on a "one-shot" basis. They were good when made, but quickly became outdated and ineffective in reflecting the status of the road systems. However, in recent years, highway organizations have developed methods of rating the sections of highways and streets in a way that lends itself admirably to the inventorying process. The method has evolved out of the so-called "sufficiency rating" of highways. Because of its importance to the inventorying process and because it is the key also to other aspects of getting business practices into the government function of building and maintaining highways, I shall describe the sufficiency ratings in some detail.

Sufficiency Ratings

The theory of sufficiency ratings is extremely simple. A completely adequate section of highway rates 100. All road sections that have deficiencies of any kind in their structural make-up, their effectiveness in serving traffic, or their safety, are marked down from 100, according to formulae and procedures. The lower the rating, the poorer the road is.

Sufficiency ratings are reviewed each year to take account of the various changes in traffic and road conditions.

In the mechanics of establishing sufficiency ratings, various elements are evaluated to get a measure of condition, safety and service. These elements are then combined to give the overall rating. Arizona, as an example, assigns par weightings to different elements as follows:

Structural adequacy	17
Estimated life	13
Maintenance economy	5
CONDITION	35
Roadway width	8
Surface width	7
Safe stopping sight distance	10
Consistency	5
SAFETY	30
Alignment	12
Passing opportunity	8
Surface width	5
Sway	5
Roughness	5
SERVICE	35
GRAND TOTAL	100

There are variations between the

(Continued on Page 4)

Roy E. Jorgensen, Engineering Counsel, National Highway Users Conference, presented this talk at the April 8, 1953 meeting, 39th Annual Road School, at Purdue University.

(Continued from Page 3)

procedures used in different states for making the sufficiency ratings. This is to be expected. The importance of different major factors—condition, safety and service, as well as the individual elements such as width, curvature, etc.—may change from state to state and likely will vary from primary to secondary to tertiary systems within a state, and between urban and rural systems. Basically, the approach is the same, however. It is aimed at determining how and to what degree the individual existing road and street sections stack up in comparision with completely adequate facilities.

The establishment of sufficiency ratings require a combination of office and field evaluations. Office records provide information on traffic and widths and ages of surfaces, as well as roadway width, curvature and gradient. In some organizations, there is also good and significant record data on accidents and maintenance cost. These data provide a basis for much of the evaluation of a road section in relation to the characteristics of a completely adequate facility. However, a field survey is required properly to appraise the structural condition and to make additional evaluations which cannot be effected from record data. Various means have been used in different states to reduce as far as possible the influence of personal judgment and to assure uniformity where application of such judgment is necessary. Obviously, the operation must be directed toward getting an unbiased evaluation throughout the road system.

It is the practice, after the sufficiency ratings have been determined, to make what is called a traffic adjustment. This is done to give weight to the traffic importance of the road section. As the basic rating is made, low traffic volume roads are rated against standards appropriate for the traffic served and high traffic volume roads are rated against appropriate standards for them. The end rating is comparable—i. e., a 70 basic rating on a 100 vehicle-a-day road is just as good in its service for the 100 vehicles as a 70 rating road carrying 1,000 vehicles a day. However, it is obvious that the benefits associated with improvements of high traffic roads would be greater than for a similarly rated low traffic road. In recognition of this, a traffic adjustment factor is applied to the basic rating to get the final sufficiency rating. The adjusted or final rating provides values which can be set up in order of magnitude to reflect priority of need for improvement, recognizing that where traffic is greater, urgency for action is greater.

A great many states—29 as of July last year—have adopted sufficiency ratings. The situation in Illinois and Colorado is unique in that the legislatures have passed laws requiring that there be developed an annual list of proposed highway improvements in their relative order of urgency, and that the list be published. This requirement is met by using sufficiency ratings. The U. S. Bureau of Public Roads has established the sufficiency rating procedure as a part of their maintenance inspection of Federal-aid highways. It is understood that as a result, they now have ratings for all sections of the Federal-aid primary system. In addition to utilizing the sufficiency ratings as a part of the maintenance inspection reporting, the BPR has been supporting its request for critical materials for highway work with the sufficiency rating of sections on which work is to be done.

When an entire road system has been rated, it is immediately evident which are the worst road sections. There is an indication, too, through the magnitude of the rating, of just how critical the inadequacy is on specific road sections. Interested individuals and groups, even though they have no familiarity with engineering, find that sufficiency ratings provide a simple, readily understandable evaluation of the highway system. It shows them clearly where the critical highway needs are and the magnitude of the problem of correcting the deficiencies.

States which are making sufficiency ratings are in a position to develop annual inventories from these ratings. Arizona, where the procedure was developed, has done an extremely effective job of making annual inventories of the Federal-aid primary and secondary highway systems since 1947. The data are formed into a report each year and provide an excellent example of the value of such an inventory.

From each year's inventory, Arizona makes a listing of all sections of each road system in order from the lowest rating section. This, together with a map which symbolizes the rating along every section of highway, shows clearly where the worst road sections are and how bad they are, in comparison with all other road sections. In addition, the annual Arizona report shows a comparison with the situation in previous years indicating the degree to which progress is being made in improvement of the system. The miles of highway below critical sufficiency rating values (50 and 60) are reported for each year. The situation for the Federal-aid primary system

Net Rating Group	*No. of Miles*	*Cumulative Miles*	*Needs Cost for Group*	*Cumulative Needs Cost*
Proj.	21.3	21.3	3,980,220	3,980,220
35-39	8.3	29.6	1,846,085	5,826,305
40-44	51.6	81.2	7,535,906	13,362,211
45-49	70.7	151.9	11,002,480	24,364,691
50-54	95.1	247.0	12,438,026	36,802,717
55-59	108.9	355.9	12,517,808	49,320,525
60-64	355.4	711.3	39,158,265	88,478,790
65-69	444.4	1,155.7	33,284,652	121,763,442
Total	1,155.7		121,763,442	

Figure 1. Tabulation for Colorado's Primary System.

below 60 points, was shown, as follows, in 1952:

As of Jan. 1	Mileage at or below 60 points
1947	650
1948	564
1949	601
1950	538
1951	479
1952	448

Another state which gives promise of developing an excellent continuing inventory is Colorado. In its report of 1952, they initiated a tabulation which illustrates the great potential value of these inventories in presenting the highway situation in most significant form —dollars. For both the Federal-aid primary and secondary systems, tabulations are made to show the mileage of road sections in each system, which are in critical sufficiency rating groups (35-39; 40-44; etc.), and the cost of making the necessary road improvements. The table for the Primary system is shown in figure 1 on page 4.

When this sort of a tabulation is brought up-to-date each year, it will show not only the status of the system mileage-wise, but also what the cost requirement for modernization is.

Priority Programs

Business must have its program for plant improvement or expansion set up to take care of first-things-first, but at the same time, geared to an overall long-range program. That is essential in good highway practice, too, and, in one way or another, what highway administrators have been shooting for over the years.

It became apparent as soon as the job of building America's highways was getting started, that there was a need for giving priority for improvement. The first state-aid to local governments in some states and the first Federal-aid to state governments in 1916, did not impose requirements as to routes on which the funds were to be expended. As a result, the first projects were not laid out so as to lead to a continuous route improvement, even from community to community within the states. There was a need then for giving priority to certain routes. Recognition of this was not long in developing, and provision made by legislation that the funds be spent on a specific, designated, interconnected system of roads. The system designation established a priority in that funds were directed toward improving the system as an integrated unit.

The system designations gave a general priority to selected routes, even though they did not give a specific project priority. Further refinement of this approach (usually an undesirable one) has been effected by state legislatures when they have enacted laws directing the improvement of specific projects or routes presently in a system or to be added to a system. This process of getting priority has generally not been good because it discourages an objective engineering approach to the development of the highway system, and encourages programming by pressure rather than by plan. It represents one of the strongest arguments for a sound

(Continued on Page 6)

QUALITY WORKMANSHIP ASSURES TOP PERFORMANCE

Quality and speed are essential in repairing, reconditioning, and modernizing electric apparatus.

At Chicago's General Electric Apparatus Service Shop, skilled technicians, modern tools and genuine G-E Renewal Parts combine to make repairs that meet exacting specifications of original equipment.

These General Electric facilities are available to you on a round-the-clock basis when emergencies require. Where desirable, our expert crews can make repairs on your own premises. 673-50

FOR SERVICE DAY OR NIGHT
Call G-E Apparatus Service Shop
849 S. Clinton Street
Chicago 80, Illinois
Wabash 2-5611

GENERAL ELECTRIC

(Continued from Page 5)

priority programming procedure, accepted and supported by the public. With a sound, well-established procedure the legislature is not so likely to go along with bills for special projects.

A variety of procedures have been used by highway officials to establish priorities for highway programs. But, only with the development and use of sufficiency ratings, has it been possible to set up priorities of a first-things-first basis that the public, highway users and the legislature can understand. The ratings show in a single numerical value the degree of adequacy of each road section and permit ready relationship of the need for improvement on any section to the need of all others.

It might be assumed that the answer to all our programming problems is provided with the development of sufficiency ratings—that programs can be prepared simply by taking the funds available for each road system (primary, secondary, tertiary and urban) and going down the list of road sections from the poorest, to the next poorest, etc., as far as the funds will go. However, there are considerations which will not permit going right down the list, project by project.

In the first place, it will be found that certain projects must go ahead, regardless of the rating of the road section, in order to make previously initiated work fully effective. These may be elements in stage construction or essential highway conncetors.

In addition, it will be found that emergency or near-emergency conditions will necessitate inclusion of highway and bridge projects in the program, regardless of where they stand in an over-all sufficiency rating appraisal. A bridge failure, or a bridge in imminent danger of failure, must be scheduled for replacement if it cannot be restored properly by maintenance operations. Likewise, when a road surface reaches a state of structural deterioration such that it cannot be effectively maintained, replacement or reconstruction must be scheduled regardless of the total rating of the road section.

It can be seen from the foregoing that the establishment of the annual highway improvement program must take account of a number of demands before programming on a priority list basis can be started. However, when commitments of funds have been made for emergency jobs, etc., the balance of the programming can be done using the listings as a guide to assure as nearly as possible, the taking care of the worst road sections first. In this process, there cannot be a strict following of the listing, but there should be a selection such that work is concentrated on road sections which rate poorly. The reason that the list cannot be followed rigidly, include:

1. The cost of improvement is not reflected in the sufficiency rating. Budgetary limitations may force postponement of a job. Or, the economics of the situation may be such that several less costly improvements for the same money, will do more to bring up the overall level of adequacy of the road system.

2. Distribution of work throughout the state may be necessary. Engineering forces should be set up to meet the needs in different areas of the state over a period of years. It is not practical to make major shifts from year to year to assure a strict section by section following of a state-wide sufficiency rating list.

3. Right of way problems, design difficulties or other procedural problems may necessitate passing over certain road sections.

It should not be concluded from the foregoing that there are so many exceptions as to make the use of the rating lists ineffective. The case of Arizona is a good illustration of this. It is reported by State highway officials that over 80% of the work programmed, since the adoption of the sufficiency rating procedure, has been directed toward road sections rating less than 60. Furthermore, the balance of the program was not indiscriminately set up, but, to a large extent, in accordance with established policy, involved the bituminous surfacing of previously unstabilized state highway surfaces.

This discussion of priorities has been based on the development and use of sufficiency ratings. It has proven to be a practical approach to the evaluation of the road systems under jurisdiction of state highway departments. Representatives of a number of counties have expressed a strong interest in establishing sufficiency ratings for county road systems, but, to date, I know of none in which it is being done. It is apparent that the large road mileages under county administration make the sufficiency rating job one of considerable magnitude, particularly in view of the limited technical personnel available. Possibly, if the way could be found to do the initial job, many counties could handle the annual revision which would not be too difficult once the first inventory were made, forms were set up, and a routine established. I am hopeful something will develop along this line, possibly with state cooperation.

In the meantime, the show must go on, and priorities are being set for county highway improvement programs. In at least one instance, a simple rating scheme has been developed to provide an acceptable guide. It is a code system which fixes improvement priorities in Harford County, Maryland, and is described in some detail in the February issue of *Better Roads*. It's a simple, straightforward, factual approach that seems to do the job in that county. Possibly other counties will find the Harford system adaptable to their problems, with or without modifications. Harford County has 320 miles of so-called "unimproved road" which are fairly uniform in their structural characteristics. The County has funds to improve about 16 miles a year and the question is, "which 16 miles shall it be?"

To determine which of the road sections should receive first attention, the Harford County approach takes five factors into account. A residential factor allows 1 point for 5 residences or less along a stretch of roadway, to 5 points for 21 residences or more. One point is allowed for up to 50 vehicles using the road per day to 5 points for 201 vehicles or more. One point is allowed if the road is a connecting link between two hard-surfaced highways, and 1 point is given if the road is a proposed school bus route. If the road is approved for Federal-aid, 2 points are allowed; if it may be approved for Federal-aid in the future, an allowance of 1 point is made.

The higher the final code ratings, the more urgent is the need for improvement.

One Harford County gravel road will be improved with a bituminous macadam surface in 1953 because its Code

(Continued on Page 13)

A Century of Printing Progress

By Hon. John J. Deviny

Throughout America this month National Bible Week will be celebrated in observance of the 500th anniversary of the first printing of the Bible by Johannes Gutenberg. The Bureau of Engraving and Printing, where I worked for many years, has run off 110,000,000 commemorative stamps on a modern rotary press equipped with electric-eye perforators and other up-to-date innovations.

Newspapers and magazines will carry thousands of columns of news to record the celebration. These comments, in the aggregate, will represent an amount of printing far exceeding that of the original printed Bible itself. But fast composing machines and great presses, engineered for speed, efficiency and versatility, will absorb the work as mere routine. Daily newspapers which carry the Bible Week story will have a mass circulation of more millions of copies than the 15th century printers could produce in hundreds.

Almost simultaneously with the Bible commemorative, the Post Office has issued the special stamp in honor of the American Society of Civil Engineers and placed the first of them on sale here in Chicago last week. The two events are apparently unrelated but in my opinion the mechanical wonders that have been brought about by the members of your Society depend as much on Gutenberg's invention as we of the printing industry owe to you for the better tools of production that we are privileged to use. Mark Twain has put it better than I can in these words:

"There is not a material marvel of this marvelous age in which we live whose fatherhood cannot be traced distinctly back to a single point, a single remote germ, a single primal source—the movable types of Gutenberg and Fust."

With these movable types, man found a new and most efficient way of communicating and recording ideas—a method that was able to transcend all the barriers of time and space. Through its magic, knowledge became the heritage of all men and of all ages If, a hundred years from now, a Bi-centennial of Engineering should be celebrated, its participants will be able to find a printed record of our activities here, perhaps even of these words I am speaking at this moment.

There have since been developed, through the engineering genius of America and other lands—but always with the aid of these movable types—marvelous and astounding mediums of communciation to supplement the printed word. They are all represented here—the telephone and telegraph, radio and television and motion pictures— but printing remains the oldest and the most universally used, with the prospects of a future brighter than its brilliant history.

The Gutenberg Bible was printed from movable types on a crude hand press adapted from the wine and cheese presses found in the houses of medieval times. The press was fashioned of two upright timbers with cross members to hold them together at top and bottom. Intermediate members supported the type bed and through another a wooden screw passed, its lower point resting on the center of the platen which was thus pressed down upon the type. The earliest contemporary picture of the press appeared in a book called *The Dance of Death* printed in Lyons in 1499. (The Government Printing Office reprinted *The Dance of Death* for the Library of Congress several years ago and with it won a place in the best 50 books of the year.) This simple form of press which Gutenberg used remained virtually unchanged as the principal tool of printing-house production for nearly 400 years.

Indeed, and probably not by coincidence, the history of modern printing presses begins almost exactly with the founding of the American Society of Civil Engineers.

But it is a striking fact that the revival of fine printing, which began in the closing years of the 19th century, did not produce presswork that was an improvement over the earliest days of the craft; yet Gutenberg would have felt an ease and familiarity with the hand press of that time, after more than 400 years of printing history.

Another paradoxical note on the development of printing equipment is this: during the last three-quarters of the 19th century, which was the period of greatest mechanical advancement, the quality of our product was at a very low point, scarcely better than in the earliest days of American printing. It has been during the last half-century that we printers have learned to use the tools developed by engineering principles. To put it another way, in my own lifetime, and during a not inconsiderable part of the life of the American Society of Civil Engineers, there have come far greater advances in our mechanical tools and in our use of them than in the half millennium that went before.

Although the present-day printing industry is ranked as the 5th largest industry in America, it is made up of many small units and is, in that respect, unlike the automobile industry, the railroad and electrical manufacturing industries and other large and powerful groups consisting of a few units. Printing houses, newspaper plants, publishers and related industries total more than 30,000 separate establishments. It seems but natural that they have problems preventing the mechanical advancements that are possible when a few great leaders control an entire industry. Another obstacle to engineering progress is the dependency of the industry on craft skill. But we are overcoming these handicaps.

There had, of course, been minor changes and improvements in the press of Gutenberg before the beginning of the 19th century. By 1620 it is recorded that William Jensen Blaew added wires and cords and passed his spindle

(Continued on Page 8)

John J. Deviny gave this talk before the Communications Symposium of the Centennial of Engineering as Public Printer of the United States. He gave it on September 12, 1952 in Chicago.

(Continued from Page 7)

through a block to prevent twisting of the platen, devised a means of rolling the bed in and out, and added a new form of iron handlever for turning the screw. This was substantially the same press that Benjamin Franklin used 300 years after Gutenberg's time.

The Earl of Stanhope in 1798 built the first press of cast iron and improved the impression action by a combination of levers, which when applied to the old wooden presses resulted generally in their destruction.

The famous Washington hand press, still in use by some printers for taking proofs, was developed from changes instituted by Peter Smith in 1822 and Samuel Rust in 1827. Smith later became connected with the Hoe Company which builds some of today's great newspaper presses. The Washington hand press substitutes toggle joints for the old screw. Power presses did not appear until 1822 and were still in embryonic and experimental stages in 1852 when your Association was born. In the meantime, between 1812 and 1853, cylinder types of presses were being designed and built; by the latter date the stop cylinder press was being successfully operated in this country. The idea of printing from a cylinder rolling over a flat bed was not a new idea, having been employed by printers of copper-plated engravings as early as the 15th century. As a plate-printer originally by profession, I am glad to accept this credit for the trade which I learned.

The early cylinder presses, depending on their size, were powered by dogs, donkeys, horses and men. Under the strain of the impression the animal would be pulled back on his haunches and the work was so strenuous that the animal could work only in 4-hour relays, although the printer then was working a 12-hour day.

American-developed flat-bed cylinders were, however, the world's best and even today our 2-revolution cylinder press is more efficient than any other for fine work. It is necessary, though, that its speed be further increased to compete with other types of production. It cannot be greatly speeded up in its present form —there is too much lost motion in the reciprocating action.

In 1846 the Hoe Company presented to a waiting world the Lightning Type-revolving Press. The type was locked onto the printing cylinder in a curved chase and wedged-shaped column rules helped to hold it in place. It is reputed, however, to have thrown more lead than a gatling gun. As many as ten feeders fed sheets into impression cylinders. This press held unchallenged supremacy in the newspaper field for 20 years, using stereotype plates when they were sometime later invented. The Lightning Type-Revolving press increased production to 20,000 an hour from a previous maximum of 3,600.

The first press to print face and back from a web or roll of paper was engineered by William Bullock of Philadelphia in 1865. One of them was installed in the Government Printing Office. From that time on the development and advancements of press design and construction were rapid. In 1889 the New York Herald installed a sextuple newspaper press which had the general characteristics of today's great presses, printing, cutting, pasting, folding, counting and delivery, all at high speed. The multicolor press performing all of the same operation was then but a short step ahead.

I have given you only a very sketchy picture of the development of our presses. I have necessarily omitted the names of the many engineering geniuses who were responsible for our present miraculous equipment. They began with a press built by the local carpenter or by the printer himself in a few hours or at most a few days. In the Government Printing Office today we have three new presses for the printing of the Congressional Record which cost just about a million dollars. There was a lapse of about two years from the designer's drawing board up to the time of installation and the engineers are still making the finer adjustments. But these presses are already capable of outproducing the presses of twenty-six years ago by nearly 100 percent and when completely tuned up one of our biggest problems will be getting the work away from the delivery end.

There is no monopoly in the printing equipment industry today, and fine presses of all sizes and for all purposes, embodying the most modern engineering advances, are being built by a dozen or more plants. And the post-war development of foreign-built presses is keeping the spirit of competition alive.

Stop for a moment and consider the importance of printing in our daily lives —not only our great newspapers and periodicals, which affect our thinking, our education and our cultural progress, but printing of other kinds, for an incredible number of uses. Only when we look back a little and see the distance we have come do we realize the debt we owe to the engineer. He has helped to make possible the billions of printed pieces that circulate every day, where formerly thousands of copies had to suffice.

Printing progress may be likened to the rapid advance in automotive transportation except that printing is far more essential than this virtual newcomer of modern civilization. The automobile of 35 or 40 years ago had all the basic parts that the 1952 car possesses and it would take you places just as our presses of a hundred years ago would print. The amazing progress that has been built into our automobile is comparable to what has happened to printing. Even in the short time since the Second World War, without revolutionary changes, the printing engineers have made refinements on the press to step up production considerably.

I might tell you now that in the Government Printing Office we rely greatly on our engineers to keep the plant in a smooth-running, efficient operation, and we rank our Plant Engineer above the level of production superintendents. As a result of the application of engineering principles to plant maintenance, I believe we have the finest, cleanest, safest, and most efficient plant in this country. Our engineer's study of plant illumination and color schemes for our workrooms and the free use of his plans throughout the Office have made it a showplace and a model for printing houses throughout the nation.

The organized Printing Industry of America has recognized the importance of engineering by the creation of a Research and Engineering Council. We are proud of the fact that a former Government Printing Office production man is acting as consultant to the Council.

The accomplishments of engineering in the field of printing equipment are many. With your help, the industry has kept pace with the needs of our civilization. But there must be an easier way

to do it. What is there that stands out as the most obvious characteristic of the industry? Is it not astounding that we must employ such cumbersome machinery to put an unmeasurably delicate film of ink on a thin sheet of paper? The presses for the Congressional Record, performing a simple one-color operation, consist of 87 tons of steel and other metal. What is their fundamental job? Why, to cover part of a 35 x 46 inch area with a thimbleful of ink. Our presses, employing the identical principles of 500 years ago, now dwarf the most gigantic earth-moving equipment. A locomotive that can draw a mile-long freight train is physically small beside our great newspaper presses. Admittedly the feeding, folding and delivery attachments are a large part of the mechanism. But the time must come, and I think it will, when engineers can find a lighter, smaller, more flexible machine to produce our work. Probably it must come through a change in our methods. Perhaps it can be adapted to several methods of printing, and that would be most desirable. We have seen recent examples of newspapers produced when metal type was not available, that failed miserably of meeting present-day standards, even after a most complex series of operations to produce the only kind of printing plate that could be used on their presses. Printing equipment engineers are aware of this problem of size and weight and at least one engineering firm has developed an onset method by which ink is transferred to paper by electronic impulse. It is also obvious that the chemical engineers have not satisfactorily solved the problem of drying the ink rapidly enough without huge drums, sprays, gas flames, heating rollers, and vaporizers. The industry needs an ink which will set instantaneously when it hits the paper.

Naturally, other printing processes and even the manufacturing of supplies have contributed both to the advancement of press development and to the need for better, faster presses. Take paper-making as an example. It has a distinguished history of its own, longer at least than the history of printing.

As the printing industry developed and increased its capacity, the papermaker was forced to keep pace. When the presses began to demand more and more paper, using up the rags that were its earlier ingredient, substitutes had to be found, the most common, of course, being wood. Everybody is familiar with the present situation in newsprint—our giant presses consume millions of tons, yet the demand outruns supply and the price goes up and up. It is only a few years since extensive experiments and research showed us that southern pine could make a satisfactory newsprint paper. And now the same testing and research goes on with bagasse, a refuse from sugarcane stalks.

Not only has the progress of the printing industry demanded more and more paper, but its specifications have become increasingly exacting. Where strength and appearance were the principal requirements of paper in the days of the hand press, when illustrations began to be used, when the press became capable of printing from a web, when color became common, then we had to call on the chemists and engineers to build other qualities into the paper. We had to have finish, uniform texture and thickness, tensile and bursting strength, pick resistance, opacity, cleanliness, brightness, and other characteristics for high-speed quality production. The engineer has played his part well to give us more and better paper.

Like letterpress printing, the basic principles of the equipment for papermaking have changed relatively little since the invention of the Fourdrinier papermaking machine. The wealthy Fourdrinier brothers, successful London stationers, bought the rights to a machine devised in 1798 by Louis Robert at the Essonne Mill in France. The Fourdriniers spent several years and a fortune improving the Robert Machine. The French Revolution delayed the development of the French paper mills where most of Europe's paper was made, but by 1815 Fourdriniers were installed in France and were turning out a week's quantity of paper in a single day. Between 1815 and 1830 many patents were issued for improvements in papermaking machinery and the Fourdriniers were in use throughout Europe. In the year 1830 a mill at Derbyshire turned out a sheet of paper 13,800 feet long and 4 feet wide. By 1835 English mills were making 50,000,000 pounds of first-class stock annually. This is about one-fourth of the Government Printing Office's consumption in 1952 and far less than a large metropolitan newspaper uses.

I am scarcely qualified to tell you all the engineering needs of the paper industry, but I can point to the possibility of mechanical methods for improving paper quality as regards cleanliness, uniformity, web structure and surface characteristics. Experiments with centrifugal stock-cleaning devices show

(Continued on Page 15)

FEDERAL PIPE & SUPPLY CO.

900 S. CAMPBELL AVE.

CHICAGO 12, ILL.

PIPE — VALVES — FITTINGS

PIPE FABRICATION

SEELEY 3-6960

Do your friend a favor—
Invite him to join WSE

●

Remember, the Society is as strong as its members collectively, and the more members, the stronger the Society.

Your friend will help make WSE stronger, and at the same time, make you stronger in your profession.

●

Western Society of Engineers

84 East Randolph Street

Chicago 1, Illinois

Perfect Radio Multiplex

The perfection of a system of multiplex transmission by Dr. Edwin H. Armstrong, professor of Electrical Engineering at Columbia University, and John H. Bose, of Columbia's Marcellus Hartley Research Laboratories, that enables FM broadcasting stations to transmit simultaneously two or more different programs was announced by Dr. Armstrong, MWSE, at Columbia recently.

The system is the most recent development based on principles which were described by Dr. Armstrong in his original announcement of his FM system in 1935. The new development, however, employs a number of improvements created since World War II.

The result, according to Dr. Armstrong, will be to double, at least, the effective function of the FM transmitter, "with obvious far-reaching effects on the methods of broadcasting radio communications of all kinds."

Several new types of service are made possible by the system announced on March 17. An FM station, for example, can transmit a musical program on one channel, and simultaneously send out on a second channel a voice program such as a speech, news bulletins or an advertising program; or it can transmit a single program stereophonically on the two channels. It can also act to transmit two independent musical programs so as to relay along a program to another station which it itself is not carrying on the main channel. All of these methods of operation have been successfully tested at Dr. Armstrong's Alpine FM transmitter, KE2XCC, at Alpine, N. J.

Dr. Armstrong added that, of course, the system would not be limited to two channels only.

It was from the Marcellus Hartley Research Laboratories on the Morningside Heights campus that Dr. Armstrong, a former pupil of the late Professor Michael I. Pupin of Columbia, announced on April 26, 1935, the invention of the FM system of radio transmission and reception which wipes out the effects of static, tube noises and fading.

The present-day FM set is quite unaffected by the presence of the second channel, Dr. Armstrong said. Listeners on present-day FM sets, in fact, are unaware that there is a second program from Alpine that they are missing. Such two-channel transmissions have passed unnoticed for several years from the Alpine station. In order to receive the second channel, a modified form of FM receiver will be necessary, but the number of additional parts required will not unduly increase the cost of the set.

The combination of the two channels, according to Dr. Armstrong, has practical and significant possibilities. There can be a period of the day when the housewife, for instance, may be especially interested in listening to advertising announcements to guide her in her purchases. For an adequate period she can have an uninterrupted flow of such announcements on the second channel. There are times of the day when stock market reports are of primary interest to a large number of listeners; other times when sports news or weather and traffic information may be of special interest. A flip of the switch to the second channel can deliver such news undiluted while the main channel continues to provide the more normal type of radio fare.

While multiplex operation of FM in the communications field has been in practical use for some years, its use in broadcasting presented problems not important in the communications field. These problems have been studied and successfully disposed of in several years of quiet work in the Marcellus Hartley Research Laboratories at Columbia and in experimental tests at the Alpine transmitter, with the result that announcement can now be made that the system has been brough to a practical entity, according to Dr. Armstrong. The credit for the engineering of the system, he said, belongs to Mr. Bose who, with Perry Osborn, chief engineer of the Alpine station, directed the experimental work.

Dr. Armstrong, MWSE, as he appeared on February 19, 1951, the night he was presented the Washington Award.

"Because of the extreme high fidelity requirements of the FM system," said Dr. Armstrong, "the problem of cross modulation between the channels was not simple, as the intrusion of one channel into the province of the other had to be kept below one part in a million.

"However, this difficulty has been effectively met and a number of interesting experiments have been made to demonstrate this. Last summer, during thunderstorm weather, at Bayport, L.I., fifty miles from Alpine, signals were received on the second channel with a clarity equal to that of the main channel. It has been found possible to receive the signals of New York FM stations at Alpine and to re-transmit them to Bayport on the second channel with a freedom from disturbance equal to that obtained when the FM station originating the program was picked up directly at the Long Island site. The freedom from disturbance is infinitely better than the signals from the corresponding New York AM station.

"In other words, FM's 'second team' outclassed AM's first (and only) team. Even when the signals from the 50 kilowatt New York AM station were unusable at Bayport, the second channel relayed programs which were perfectly quiet. Tape recordings have been made to demonstrate these effects.

"On election night last November," Dr. Armstrong related, "the Alpine transmitter was accorded the courtesy of rebroadcasting the returns sent out from WNYC-FM. These returns were sent out on the second channel and a complete tape recording was successfully made of the proceedings from 9 P. M. to 2:30 A.M. at the Bayport location. A similar recording was made at Columbia of President Eisenhower's January inauguration ceremonies when the proceedings

(Continued on Page 12)

(Continued from Page 11)

which came from Washington were broadcast on both channels from Alpine and both received equally well at the Marcellus Hartley Research Laboratories."

Dr. Armstrong declined to estimate the length of time which will be required to set up a regular standardized service, noting that there are problems other than technical ones involved. The new type transmissions from Alpine will continue, he said.

He added that the real significance of the new system is that the most confirmed "Doubting Thomas" will now be obliged to recognize that FM will prevail as the final aural system. It would be completely impossible to multiplex on any AM system, either on the standard band, or on a very high frequency (v.h.f.) band of the same frequency as the FM stations, and a station operator who can sell time on two channels obviously will outsell eventually the station operator with only one. The cost of equipping a transmitter for multiplex operation is not high. Transmitters already equipped with Serrasoid modulators which are employed in the new system are most readily susceptible to change, he said. Receiver prices will doubtless follow the course they have always taken since the superheterodyne receiver was introduced, producing a set ultimately fitting the capabilities of everyone's pocketbook.

Dr. Armstrong pointed out that the new system also has great advantages over the "storecasting" system now in use. It is necessary now when an announcement is to be made over the storecasting radio transmitter to mute all the listening receivers located in stores selling goods to which the announcement does not apply. This is accomplished by sending out an inaudible tone. This is done because it is not useful to have the storecasting radio in the corner tobacco shop broadcast a reminder to the housewife that she needs a box of soap powder for tomorrow's washing. With the new multiplex system, the musical program can be continued without interruption in all shops except the one to which the announcement is pertinent. The voice announcement can be made to the shops concerned over the alternate channel.

Dr. Armstrong said that with the coming of binaural transmission, all prophecies made in his original announcement at Columbia in April, 1935, about the FM system have come true.

"Those forecasts, considered fanciful at the time," he said, "were elimination of static and fading; absolute realism in voice and musical reproduction; a new era in point-to-point communication; the use of FM to solve the problem of inter-city television; multiplex transmission; and finally binaural or stereophonic transmission.

"When the system was first made public," he said, "it was labelled as a 'visionary dream' by some. But all of the predictions have now come true."

How FM Was Introduced in 1935

A new and revolutionary system of radio transmission and reception which wipes out the effects of static, tube noises, and fading has been invented by Major Edwin H. Armstrong, professor of electrical engineering at Columbia University, it was announced at Columbia on April 26, 1935.

The invention is based on principles directly opposed to accepted scientific theories of action of electrical disturbances on radio circuits. It makes ultra-short wave broadcasting practical, and assures the transmission of musical programs of a quality beyond the range of present-day broadcasting possibilities, according to Major Armstrong.

A new era in the field of point-to-point communications on ultra-high frequencies has been inaugurated as a result of tests of the new apparatus, it was declared. The problem of chain television will be solved, making possible the linking up of different parts of the country, predicted Major Armstrong, who holds the medal of the Institute of Radio Engineers for his invention of regeneration, and who also invented the superheterodyne and super-regenerative circuits.

The achievement climaxes twenty years of research on the elimination of static, begun by Major Armstrong as a pupil of the late Prof. Michael I. Pupin of Columbia University.

For the past year the new apparatus has been undergoing continuous tests, which have been conducted with great secrecy, between the Empire State building in New York City and private homes in Westhampton, Long Island, and Haddonfield, N. J. Major Armstrong declares that multiplex transmission has been effectively carried out by new methods during these tests, four separate channels having been operated simultaneously between New York and Haddonfield.

A fundamental principle consists in introducing into the transmitted wave a characteristic which does not exist in the waves produced by nature. A receiving system is then used which is not responsive to waves of natural origin, but only to the waves having the special characteristic.

"The principle is carried out by the use of a discarded method of modulation known as frequency modulation," Major Armstrong states. "This method of modulation has been known for over twenty years, and the hitherto unsurmounted difficulties due to distortion and other troubles in both transmitter and receiver have caused its abandonment by all who worked with it.

"The original demonstrations of the system were made at Columbia University in the beginning of 1934, where, it was explained to some of the leading engineers of the country. As a result of these demonstrations, the short wave transmitter on the Empire State building was placed at my disposal by the National Broadcasting Co. about a year ago.

"Tests have been continuous but so secret that our work passed unnoticed, except by amateurs who frequently advised the engineer in charge of the station to find out what was wrong with his transmitter. Last June demonstrations were made between the Empire State and Westhampton, Long Island, at the home of George Burghard, an old-time amateur and friend of Major Armstrong.

Subsequently the apparatus was removed to Haddonfield, N. J. near Camden, where it was located in the home of Harry Sadenwater, of the R.C.A.-Victor Co. also a friend of the amateur days of Major Armstrong. Although the power used at the Empire State transmitter was under two kilowatts, at no time during the last year either at Westhampton or at Haddonfield were the programs interrupted by either static or fading. On the other hand in the summertime it was frequently impossible to listen to either of the 50-kilowatt stations WJZ and WEAF on account of the static.

(Continued on Page 17)

Annual Inventories

(Continued from Page 6)

Rating is high—7. A breakdown of the factors and point scores follows:

11 residences	3 points
69 vehicles a day	2 points
No connecting link	0 points
No school bus route	0 points
Federal-aid secondary route	2 points
Final Classification	7 points

Another road falls in a much lower code classification—rating 2. Based upon its rating this road is not included in the projected program for the next ten years. Factors establishing its relative priority were:

3 residences	1 point
20 vehicles a day	1 point
No connecting link	0 point
No school bus route	0 point
No Federal-aid secondary route	0 point
Final classification	2 points

The Code System was developed over a four-year period, and the statistical data used will be reviewed annually. The Harford County Highway Department has a budget of $500,000 per year.

The press and general public of Maryland have praised the new system as one which provides a common sense approach to county road improvement and a system which gives priority to the road where immediate construction is most needed.

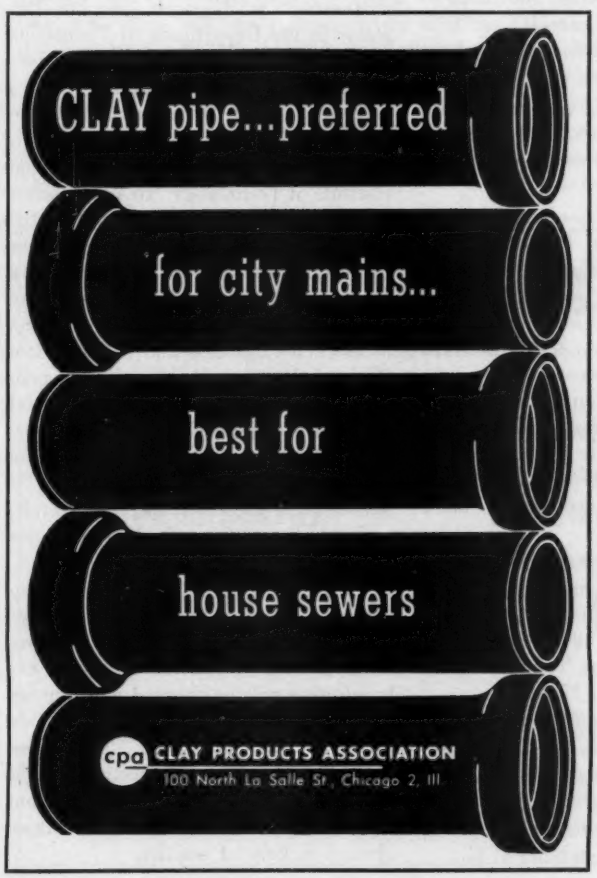
Program Reports

Most highway departments make annual or biennial reports, but they are not program reports. Probably in many cases, the reports are prepared and published to meet legislative or administrative requirements. In general, they are accounting, rather than program reports. They contain a mass of statistical data showing what monies have been spent, equipment purchased, and mileages of road types by counties or towns. They contain, also, a description of the activities of the several divisions or bureaus of the highway department. Many of these reports are excellent for their purpose—an historical record of the department activities for a year or a biennium. But, they are not the kind of simple, easy-to-read report on the highway and street system that is needed.

It has been shown that we need an annual inventory of the highway system as a sound basis for a businesslike approach to highway planning and programming. But, so also, do we need a clear-cut, simple presentation of the inventory, so the public, highway users, and the legislators, can understand how the highway business stands. It needs to be made annually, so the interested individuals do not lose touch between reports, as might occur with more infrequent reporting. Annual reports are essential, too, so progress from year to year is consistently brought to the attention of everyone interested.

I call these annual reports, program reports, yet I have been talking about an inventory and laying stress on annual reporting of the inventory. I have done this, because I am convinced that the inventory is the basic essential to any good program for adequate roads. If we have a good inventory which reflects the condition and adequacy of all parts of the road system, we can be fairly confident that the annual pro-

(Continued on Page 14)



MORRISON CONSTRUCTION CO.

ENGINEERS CONSTRUCTORS

SINCE 1925

Industrial Projects

Public Utilities

TELEPHONES
CHICAGO ESsex 5-7680; HAMMOND Sheffield 5036

MAIN OFFICE
1834 Summer Street, Hammond, Indiana

(Continued from Page 13)

grams will be well established and directed toward orderly development of the highway system, with proper attention to the most urgent needs. Particularly, will this be true if wide publicity is given to the annual inventory.

However, in the interests of presenting an effective picture of the highway system and its development, I suggest that the annual program report include a listing of project accomplishments during the past year, and a listing of projects which will be undertaken in the next year. Every effort and all the ingenuity of the highway engineers should be directed toward making these listings as informative and effective as possible, illustrating what is being done, what criteria have determined the inclusion of projects and, as well, the conditions which make necessary the postponement of certain projects, even though the existing facility is critically deficient. Illustrations, particularly maps and charts, should be helpful in presenting the story in a manner that all can understand.

It is possible that in some states it will be found necessary to get legislative authorization for annual program reporting. As previously indicated, Illinois and Colorado have a statutory requirement for a listing of the program in order of urgency. It is my thought that if such reporting is to be provided by statute, it be done in a general way. This would permit full play for new ideas and ingenuity in presentation.

The National Highway Users Conference has just announced a program of annual awards to highway departments to be given in recognition of meritorious reports on the status of road systems under their jurisdiction. It is anticipated that the awards will stimulate interest in reports both on the part of the general public and the highway departments. Public recognition will be given to the accomplishments of the highway departments in contributing to better administration and planning through the issuance of non-technical easy-to-read reports. A number of highway departments are already doing excellent work along these lines. We are confident that others will be encouraged by the attention which will be focused on reports by the NHUC awards.

In conclusion, it is my conviction that we can accomplish a great deal in improving our approach to the highway problem by adopting more generally, some business practices which are readily adaptable to highway planning and programming. First, let's get an annual inventory established for each of our road and street systems. Second, let's get a priority programming procedure that is simple yet effective. (Both of these goals are now readily accomplished with sufficiency ratings.) Third, let's get annual program reporting established as a regular and important highway department function. With these three business practices—inventory, priority programs, and program reports—we shall soon have the public informed about their highway and supporting and getting effective programs for adequate roads.

Air-entraining Agents are Boon to Concrete

Air-entraining agents for concrete, first introduced about ten years ago, now are used in an estimated 60 per cent of all concrete poured today, according to Chemical Week, McGraw-Hill publication. The present market requires about $1.5 millions' worth.

Generally speaking, the entraining agents are low-cost resin soaps that are added either at the cement mill or by the mixer.

With construction booming this year, sales of additives are expected to go even higher, the magazine says, and may soon be used in nearly all concrete. Purpose of the additives is to produce a concrete with some three-to-five per cent air by volume (for construction work; some applications require more air). This low air content reduces shrinkage, improves resistance to de-icing salts, boosts resistance to freezing and thawing and makes a more plastic, more easily poured concrete.

A very small proportion is needed—one-half oz. of the liquid additive per bag (94 lbs.) is a typical amount. For mill-added types, the additional cost to make an air-entraining cement is less than a cent per barrel (374 lbs.).

Major use of the air-entrained concrete today is for highway construction. But all sorts of concrete construction—building blocks, concrete pipe, dams, bridges, irrigation ditches—are found to benefit from the small bubbles of air.

Cement Association Appoints Hognestad

The Portland Cement Association has announced the appointment of Dr. Eivind Hognestad, former faculty member of the University of Illinois, to the staff of its Research and Development Division, effective May 1, 1953.

Well known in the United States, Canada and Europe for his work in the field of reinforced concrete and structural engineering, Dr. Hognestad has been appointed Manager of the Structural Development Section of the Association's Development Department. He succeeds C. C. Carlson, who has been appointed Manager of a newly formed Products and Applications Section.

Both appointments were announced by Dr. A. Allan Bates, Vice President for Research and Development of the Association, as part of an enlargement and reorganization of its Development Department. Dr. Bates is a member of WSE.

Prior to joining the Association, Dr. Hognestad was Research Associate Professor in the Department of Theoretical and Applied Mechanics at the University of Illinois. He holds a Master of Science degree from that University, and the degrees of Civil Engineer and Doctor of Technical Sciences from the Norwegian Institute of Technology. He is the author of numerous articles, papers, bulletins and research reports pertaining to reinforced concrete design and structural engineering, is a member of several national committees of the American Society of Civil Engineers and the American Concrete Institute, and has been a principal investigator for the Reinforced Concrete Research Council.

The Structural Development Section which he heads has been enlarged "to handle more effectively the very complex and rapidly growing field of structural concrete."

The newly formed Products and Applications Section, under the management of Mr. Carlson, will continue previous studies of concrete products and in addition will be charged with pursuit and study of new products and applications for portland cement. The Transportation Development Section of the Development Department will continue under its present manager and without change in field of activity.

Printing Progress

(Continued from Page 9)

promise. Satisfactory substitution of mechanical cleaning for drastic chemical purification would probably improve fiber quality and even result in utilization of grades of wood and other materials not now capable of being made into good paper.

Improved consistency regulators and flow control devices will add to uniformity of thickness, opacity, density and finish. Automatic beater and Jordan controls, by improving the stock, will give us better paper. We need better coordinated machine drives and automatic tension controls.

Finally, as with the presses, although this may be beyond the reach of your genius, the cost, the bulk of the paper machine and the time required to build and equip a mill are prohibitive and a barrier to the production for which a paper-hungry world is crying.

Hand in hand with improvements in the press, have come miraculous developments in the mechanical methods of assembling Gutenberg's movable types. Obviously there had been refinements in the casting of metal types, in their constituent material and in their design. The best-known names in the printing industry are perhaps those of the men who cut and designed the type styles: Aldus, Bodoni, Caslon, Garamond, Baskerville, more lately Goudy, and many others. But for nearly 450 years the manner in which the letters were assembled by hand did not change. Old time printers thought that it never would. They could not envision a machine that would calculate the size and style of type to be set, that would pull out a case, set the composing stick to the right measure, and go to work. There was the evidence of many who had tried to design such a machine and failed. But the old-time printers were wrong. For nearly 20 years Mark Twain had been putting his money into the development of a composing machine—the Paige Compositor. He lost his fortune—the machine was not successful. In 1885 the Linotype machine, designed and engineered by Ottmar Mergenthaler, was patented and was in commercial use the following year. In 1887 the Monotype was invented. The basic tools of the printing industry were then firmly established and nearly all that has happened since have been further refinements. The stereotype, the electrotype, the photo-engraving process and the halftone screen had all been developed and now fell into place in the renaissance of fine printing which accompanied the phenomenal mechanical period of the 1890's. We had reached the age of engines, dynamos and motors, the lathe and other machine-tools were with us to produce in quantity and quality the equipment required by a tremendously expanded printing industry.

Hand compositors had developed an ability to set up to 2,000 ems of type an hour. The Linotype was able to double and triple this output and it gave a vast impetus to the printing industry.

In the past two or three decades the tremendous development of offset lithography, employing metal plates in place of the lithos or stone discovered in the 18th century by Senefelder, and relying on the more recently engineered cameras of great precision and capacity, has moved this process into a position of prominence. Its presses run faster than the flat-bed cylinder, it can employ as copy whatever the camera can reproduce, and it has brought about a near revolution in composing methods. There are literally scores of devices for setting type or producing copy for printing by lithography. The problem that none of them have satisfactory solved is right-hand justification by a single keyboarding of text. But eventual overcoming of this handicap is as certain as anything can be.

Tremendous strides have already been taken. These methods which serve as a substitute for hot-metal composition have won a distinct place in the industry. Indeed, their advantages are so great that a very large number of publications are being produced in this fashion. They are particularly well adapted for setting of tabular matter, small directories and so on, but they are invading other fields as well. The designers of these typewriter style of typesetters have given us proportional spacing, electromatic manipulation, a fair variety of attractive type styles and sizes which are easily changed, and other desirable features. They can be used with the direct-image offset plates and in combination with reproduction proofs from hot metal composition. There is no limit to their usefulness and they are going to offer increasingly real competition to hot-metal composition. Another short cut is provided by the Fotosetter and similar devices which produce a film by photographing each letter image separately as the keyboard is manipulated.

Printing engineers have discovered many ways of reducing the industry's dependency on craft skills. For example,

(Continued on Page 16)

—CUSTOM BUILT—

To Your Specifications

•

Switchboards **Distribution Panels**

Benchboards **Motor Control Centers**

Panelboards **Junction Boxes**

Steel Cabinets **Raceways**

Sheet Metal and Light Structural Fabrication

Busducts

•

GUS BERTHOLD ELECTRIC CO.

1716 W. HUBBARD ST.

CHICAGO 22, ILL.

CHesapeake 3-5767

(Continued from Page 15)

by the use of direct-image plates, developed by engineering know-how, printers of large directories such as telephone books are bypassing the camera. Transparent proofs, produced in the Government Printing Office by methods we have developed are used in place of film. This method can be utilized whenever we have type or plates on hand. All manner of ingenuity is being exercised in the industry to speed and simplify our procedures and methods.

By its nature, typesetting will always involve manual operation or selection of characters. The teletypesetter, now looming large on the printing horizon, runs the linotype by tape-control at greater speed than the human operator, but the tape machine must, at some originating point, be hand operated.

The editor of *Printing Equipment Engineer* has told me that he regards one of the uses of the teletypesetter as perhaps *the* outstanding recent engineering development in the industry. This is the transmission of text copy from one end of the continent to the other and its precise duplication at one or several local points. When dummies are provided and illustrations scaled and laid out, the editors do not even have to see a proof.

Increased cost of typesetting and lithography's need for a more direct method of producing photographic copy are going to bring about greater elimination of metal type one of these days. We are working with tons of heavy metal in the form of type nearly an inch high when we are actually concerned only with the undimensionally thin surface or face. Even in letterpress printing we actually need only the face of the type.

I feel sure that lithography is about to undergo far-reaching changes. As I have said, its presses are much faster than the flat-bed cylinder, but at the end of a day when the total production count is made, we find it has not maintained its full advantage. There were too many stops for adjustment of water and acid. The result of this is going to mean a turn to the so-called dry-offset process when plate-etching methods are perfected.

The equipment which has been engineered for our platemaking operations appears less spectacular than the developments of press and composing room machinery but there has been advancement nevertheless. The use of plastics has invaded this field and wrought far-reaching changes. Also the development of new metals and combinations of metals have added to the life and efficiency of the several printing reproducibles. Electrotyping, for example, has been revolutionized by the substitution of a plastic material for the wax that was formerly universally used for molding.

As faster composition, adequate platemaking methods and greater press production came about in response to a public demand for more and more printing, there was imposed on the bookbinder a need for better equipment too. The engineer has given it to him. There was no call in this field for the working of miracles and all of the bookbinders' machines that I know about draw on what might be called prior art. They often appear to be too heavy and cumbersome for the job they have to do. The need in the bindery is for stronger, more flexible adhesives which may—and, I believe will—do away in time with laborious and expensive sewing of books.

The engineer has contributed greatly to the "wedding" of two or more processes in order to do our job more simply, effectively, and to bypass troublesome problems that may exist in a single process. They have recently designed a press that utilizes both gravure and letterpress. They have built binding facilities into the press, and incorporated slitting, perforating, stitching and pasting into our folding machines. They are bringing electronics into the complex work of color separation and of platemaking. They have developed a mechanical engraver that is already widely used throughout the country for production of quickly-made engravings of certain kinds, thereby eliminating the time delays in the regular photoengraving process.

The greatest stimulant to printing has been commerce and advertising in our great periodicals. Perhaps we think first of books and newspapers as the bulwarks of our freedom and our culture. But a single page advertisement in a weekly magazine represents an investment that would pay for the printing of an entire book. And it utilizes all the complex techniques and requires the development of the equipment we have been, for the most part, discussing. If, however, advertising has spurred the engineering of printing equipment, printing, on the other hand, has contributed immeasurably to American business, commerce and industry that is one of the glories of the modern world. Our standards of living, our spiritual and material welfare, all depend heavily on the product of the press.

If you should ask nine men what makes America great, you would probably get nine different answers. Apparently none of the figures in the great political conventions held here (Chicago) a few weeks ago were in complete agreement about it. Other lands have nearly everything that we have, so why cannot they develop a national economy to match our own? I have the tenth answer— and it is this: America leads in so many respects because nowhere else have engineers given the printing industry the means of producing so efficiently and in such quantities the printing that is the cornerstone of knowledge, of prosperity and of power.

Averagely, our real wages are 2½ times as much as our grandfathers earned and the explanation lies in the better and more productive tools the engineers have given us to work with.

America will continue to grow in greatness so long as we have this tremendous asset. I am sure that the engineering profession will strengthen its position in our national economy, do an even better job for the printing industry, and enable all of us to work more effectively for the peace, security and prosperity of America.

CSI Men Hold Meet

The Chicago Chapter of the Constructions Specifications Institute held a meeting at the Portland Cement Research Auditorium, 33 West Grand Avenue, May 12.

"Developments in Specifications for Concrete" were discussed by Harold L. Flodin, Assistant to the Manager, Structural Bureau of the Portland Cement Association. S. H. Westby, Manager of the Housing and Cement Products Bureau, conducted a tour of the P.C.A. building preceding the meeting, illustrating his tour with a talk on "Concrete Masonry and Masonry Mortars."

Radio Multiplex

(Continued from Page 12)

"In the winter time selective fading frequently interrupted the program almost as badly as static in the summer time. Neither occured with the new system.

"The system is capable of multiplex operation, and as many as four channels have been simultaneously transmitted and received using a single transmitter and a single receiver. Some multiplexing work of great importance has been carried on with Mr. C. J. Young of the R.C.A. Victor Co. but details of this work must come from Mr. Young.

"The amount of noise reduction which can be obtained depends on the strength of the noise. One of the worst disturbances encountered on short wave length are the noises due to the motion of the electrons in the circuits and in the tubes of the radio receiving set itself. On the New York-Haddonfield circuit the energy of this disturbance is reduced to one-thousandth part without losing any of the signal strength. As the strength of the disturbances increases, the ratio of improvement becomes less.

"The action is something like that of the 'tin hat' worn overseas in the AEF, practically perfect against fragments up to a certain size, but not effective against a six-inch shell.

"The practical utility of the system will be principally on the ultra-short and micro-wave signalling systems, as the bands of frequency or width of the channel required is greater than on normal broadcast wave lengths.

"For example, the band width at present used on the Empire State-Haddonfield circuit is about 150,000 cycles. This would not be a practical band width to use on present-day broadcast channels, but it is quite feasible on the 40,000,000-cycle wave used at the Empire State. The range of modulation frequencies which can be transmitted from the best transmission systems today does not extend beyond 8,000 cycles, and only frequencies up to about 5,000 cycles can be effectively used without encountering interference from adjacent channels.

"On account of the extremely short wave lengths it has been possible to transmit all modulation frequencies from thirty to 16,000 cycles, and to receive them with what engineers call a flat characteristic.

"The theory on which the problem was solved flies directly in the face of all previous mathematical deductions. The old theory of the way to shut out static assumed that the best that could be done was to narrow the band of the selective systems at the receiver as much as possible without shutting out the signal. By narrowing the band down to a width just sufficient to admit the signal, it was believed that under these conditions the signal to static ratio would be the best.

"Where the signals and disturbances are of the same order of magnitude, I find the exact opposite to be true. With proper methods of transmission and reception, the wider the band, the better will be the signal to noise ratio.

"Of all the inventions which I have made, regeneration, the super-heterodyne, and super-regeneration, the present was by far the most difficult to do and is the hardest to understand. An illustration of the difference between research in 1912 and present-day research is the comparison between the work on regeneration and this invention.

"Regeneration was finished in 1912 after six months work. One vacuum tube was used, and one measuring instrument only was employed in making a few dozen measurements. In this invention during the experimental work, over a hundred tubes were in operation simultaneously, tens of thousands of measurements were made, and countless pieces of apparatus built.

"In regard to the measuring apparatus, almost every measuring instrument made by the General Radio Co., the principal manufacturer of radio measuring equipment, was used. The total number of pieces of apparatus constructed in this work has long been lost sight of, but some idea of the amount of work involved can be gathered from the fact that the records since last October show fifty-five panels constructed and put into operation. The technical progress has been so rapid that apparatus became obsolete almost as soon as it was constructed. For example, three complete transmitting equipments, which were used in converting the Empire State transmitter to the present system, have been installed within the year."

Major Armstrong stated that the invention could be placed in operation immediately in point-to-point communications. Regarding the length of time required to put it into use in broadcasting available to the general public, he would not venture a prediction, beyond saying that many non-technical problems were involved here.

BELL LUMBER & POLE COMPANY

Producers and Wholesalers of

Transmission and Distribution Line Poles

Western Red Cedar — Douglas Fir — Western Larch
Wood Pole Preservation — (Non-Pressure)
Grade 1 Creosote or Pentachlorophenol Solution
Full Length Treating
Machine Shaving — Machine Incising
Roofing — Gaining — Drilling

524 Midland Bank Bldg.
MINNEAPOLIS 1, MINNESOTA
Phone: Atlantic 8277

WSE's Dining Room

will be closed during June, July and August, due to the construction necessary for the Society's expansion program. The Dining Room will reopen early in September.

DETROIT PUBLIC LIBRARY

On Training—

Letters from Leaders

In the last issue of Midwest Engineer we published another of about thirty letters received from leaders of Chicago-area firms concerning shortcomings noted in the engineers in their employ. Many of the letters also suggested what the engineers should do to correct their deficiencies.

Significantly, the engineer's technical training is generally considered adequate. In the broad area of Human Relations, however, engineers seem often to be "under achievers," according to the viewpoint of the industrial leaders as reflected in their letters.

We are printing another of these letters in this issue, as we shall do in future issues. Although the letters may be of greatest value to the younger engineers, we hope that all of the engineers who read them will benefit.

Here, then, is the next letter:

Dear Mr. Becker:

As you no doubt are aware, our Company is very much interested in the technical education of the young engineers and we have organized a special graduate training course for mechanical, electrical and chemical engineers where we take in about 200 engineers each year for a two-year training course.

In general, we find that the younger engineers are as well or better equipped for problems of today than the engineers of 20 or 30 years ago. In other words, we feel that there has been a gradual improvement in the training which the universities give them. It is, of course, true that all of the older engineers have a tendency to regard the recent graduates as very young and immature, but statistics show that in general the training they are getting in college is showing gradual improvement.

We however, do feel that advanced degrees and additional time in college is of less value than an equal length of training in our own plant in considering these people for our own employment. There are, of course, exceptions to this where some advanced training is desirable for a few persons to be used in our special research projects, but for the ordinary engineer who is to go into industrial designing or into our sales organization, we feel that post-graduate courses are not of as much benefit as an equal length of time on our own training program and experience in our own organization.

We are, of course, very much interested in the work which your Society is doing and the interest shown by the various organizations mentioned in your letter.

We appreciate your writing to us and hope that the comments given above will be helpful to you.

ASHVE '53 Meeting to be held in Denver

The American Society of Heating and Ventilating Engineers will hold its 1953 Semi-Annual Meeting in Denver, June 29, 30—July 1, at the Shirley-Savoy Hotel. Fourteen papers will be presented at four technical sessions devoted to determination of heat and moisture transfer through building materials, cooling tower performance, heat pump design and performance, effect of relative humidity on heat losses of individuals in various temperatures, and heat exchanges in floor panel heated rooms and heat flow analysis in panel heating and cooling sections.

The Society's Rocky Mountain Chapter will act as hosts for the meeting and the committee on arrangements will be under the direction of Fred Janssen. E. A. Thompson is vice chairman of the committee on arrangements and B. H. Spurlock, Jr., honorary chairman.

In addition to the technical sessions, other special features will include the traditional golf tournament, the Semi-Annual Banquet and the scenic wonders of Denver. A favorite tourist mecca, Denver offers Society members a wonderful family vacation combined with interesting ASHVE activities.

Advance reservation requests indicate a record attendance at the Semi-Annual Meeting. Denver, the capital of Colorado is easy to reach from all directions, and by all means of transportation—six airlines, seven railroads and six major highways. Members from most of the states and Canada are expected to attend the interesting technical sessions.

Registration will commence on Sunday, June 28, at 10 a.m. and will be from 9 a.m. each day throughout the meeting. The ASHVE Council will meet on Saturday, June 27, and the Chapters Conference Committee Meeting will be held on Sunday, June 28. The Committee on Research has meetings scheduled for both June 27 and 28. A welcome luncheon will take place at noon on Monday, June 29. As a fitting climax to the three days of ASHVE activities, The Semi-Annual Banquet will be held at 7 p.m. on Wednesday, July 1, 1953.

Professionals Set Date for Daytona Gathering

Members of the National Society of Professional Engineers will gather in Daytona Beach, Florida, June 18-20, for the Society's Annual Meeting which will include among its highlights the presentation of the NSPE Award to the nationally-known engineer, Charles F. Kettering, and the installation of T. Carr Forrest, Jr., of Dallas, Texas, as the organization's fifteenth president.

Mr. Kettering, who is vice president of General Motors, will receive the award, which is granted on the basis of meritorious service to the engineering profession, at the banquet climaxing the three-day event at the Sheraton-Beach Hotel. Bestowed for only the third time in the history of the Society, the honor has previously been accorded to former President Herbert Hoover and bridge-builder D. B. Steinman.

Devoted strictly to the professional rather than the technical aspects of engineering, the meeting will also feature a unique "State of the Profession" program on Saturday morning, June 20. NSPE's past presidents Alex Van Praag, Jr., and Perry Ford, General Electric engineer Clark Ransom, and Karl B. McEachron, formerly chairman of the Massachusetts Registration Board, will deliver the principal addresses at this special session.

NU Receives Gifts

Northwestern University has received gifts totaling $3000 for scholarships in chemistry and electrical engineering.

The chemistry department of the college of liberal arts received $2,500 from the Standard Oil foundation for a graduate fellowship in chemistry for 1953-54.

A $500 gift for an undergraduate scholarship in electrical engineering was made to the Technological Institute's department of electrical engineering by the Louis Allis company, Milwaukee.

Col. Sikes Announces Specification Institute Receives its Charter

The Chicago Chapter of the Construction Specification Institute has officially received its charter from the Washington headquarters of the Institute, it was announced recently by Col. A. W. Sikes, MWSE, Chapter President.

At the last annual meeting, Col. Sikes stated, the following officers were elected:

President, Colonel A. W. Sikes; First Vice-President, Jack Stewart Stein; 2nd Vice-President, Harold B. Potoker; Secretary, Carl E. Heimbrodt and Treasurer, James C. Bort.

Executive Committee: James Wm. Marshall, Robert B. Schell, David Koch, Edward R. Albert, Paul H. Tiffin and H. F. Gonnerman.

Architects, engineers and specification writers are invited to join the Chapter. Further information, and membership applications can be obtained from the Secretary, Carl E. Heimbrodt, A.I.A. c/o Benjamin Moore & Co., Melrose Park, Ill.

New Bulb Lasts Much Longer

An electric light bulb that burns about six times longer than the average incandescent lamp, and that gives two and a half times more white light from an equal amount of power, promises to revolutionize the lighting of factories, terminal buildings, stadiums, parking fields, building exteriors, railroad yards, streets and highways, and other large areas, a lighting engineer declared recently.

The lamp, newest version of the fluorescent-mercury two-in-one light, is one of the illumination designer's latest replies to the demands of America's ever-expanding industry for the most economical mass white light that the research scientist can produce, he said.

Speaks To Electrical Inspectors

Addressing the International Association of Electrical Inspectors at the Consolidated Edison Building in New York, Eugene W. Beggs of the Westinghouse Lamp Division, Bloomfield, N. J., revealed that a 20 per cent increase in the "life expectancy" of the new lamp is an improvement developed within the past few months.

"This newly-perfected fluorescent-mercury lamp, therefore, is the most economical and convenient source for mass white light ever produced by man —a golden white mercury that promises to revolutionize American lighting practice, particularly for large-scale operations, indoors and out," Mr. Beggs declared.

"It is the most important new light source since the birth of fluorescent lighting 15 years ago," he continued.

The new "white mercury lamp" has all of the economy and efficiency characteristics of standard mercury light, and a golden white tone besides, which makes it useful even where color appearance is important, Mr. Beggs explained.

The newest improvement in the fluorescent-mercury field is the 400-watt lamp with a life expectancy that has just been stepped up 1000 hours to a 6000-hour rated life. It supplies approximately 48 lumens per watt, or 19,000 lumens per unit.

Another version of the color-corrected mercury lamp is the 1000-watt light which produces 50,000 lumens in comparison with the 21,800 lumens produced by a 1000-watt incandescent lamp, he said. This "white mercury" has a life expectancy of 5000 hours which is five times the rated life of the incandescent lamp it is replacing in industry throughout the country.

Most Economical Mass White Light

"Supplying more white light in the first place, and supplying it more efficiently and over a considerably longer lifetime, the new fluorescent-mercury lamp has achieved the requirements that industry set for lighting engineers," Mr. Beggs said. "The 1000-watt unit, supplying 50,000 lumens, is, in fact, the most economical mass white light in the history of artificial illumination," he added.

The new two-in-one-lamp, Mr. Beggs explained, consists of a mercury arc inner tube of quartz producing not only an intense illumination but ultraviolet rays as well. This tube in turn is enclosed in a larger glass envelope whose inner surface is coated with phosphor. The ultraviolet rays cause the phosphor to fluoresce red which blends with the normal blue-green of mercury lighting.

A Date to Remember

Aug. 15

At Chevy Chase Country Club

WSE'S 4th Annual Golf Tournament

(Details on Page 2)

End Ship Water Problem

The problem of supplying fresh water for drinking, cooking and mechanical needs at sea has confronted sailors for generations. Over the years naval and marine engineers and engineers from industry have worked to develop systems by which salt water could be converted to fresh water.

The solution of this problem has enabled ships to remain at sea for long periods of time without having to take on fresh water, an engineers' forum of the American Society of Mechanical Engineers was told on March 12 in New York. The speakers were Adm. William S. Maxwell, USN (Ret.) and Lt. James W. Locke, USNR.

The best system had to be chosen for each circumstance. The best method aboard a large aircraft carrier would not be practical in a lifeboat or on a life raft. Factors, other than the size of the sea-going unit, to be considered, were the carrying capacity allotted for fresh water, the type of main propulsion equipment, and the qualifications of operating personnel.

The most widely used method of salt water conversion aboard naval or merchant ships is that of distillation.

Submarines, propelled by either diesel engines or batteries, and Landing Ship Tanks (L.S.T.'s) propelled by diesel engines, are small, carry a small number of men and have a small capacity for carrying fresh water. An exhaust gas distiller or a vapor compression distiller is used on this type of ship. In the former the heat from the exhaust gas from the diesel engine is used to evaporate the salt water. The vapor compression or "Kleinschmidt" method uses electric power as its heating medium.

A submarine chaser (PC) will have a vapor compression distiller, since most of these ships are propelld by steam—either geared turbine or turbo-electric.

Naval destroyers (DD) are larger than ships mentioned this far. They are propelled by steam—usually geared turbine. Since we must have fresh water for both boilers and personnel, we find a change in the basic type of distiller. Greater capacity and higher grade of fresh water (lower salinity in grains per gallon) are needed. Fast steaming express type boilers need a better grade of water than does the human body. Our taste and body can take water with five grains of salt per gallon, but boilers require water with as low as .25 grains of salt per gallon. To accomplish this higher capacity, distillers of the double effect low pressure type are installed. They may be solo-shell or two-shell design.

As we get into larger combatant type vessels which require much more fresh water for make-up feed and which carry many more men, we see the installed fresh water-carrying capacity increased and the installed evaporating capacity increased. We will also find the most efficient system of distillation used by the navy today—the low pressure, triple effect system. Cruisers, battleships, carriers and large auxiliaries use this method.

By adding shells and reducing pressures within these shells we have been able to turn out more water and better water for less operating cost than with other systems mentioned.

These large sets of low pressure double or triple effect evaporators are often supplemented with a high pressure single effect evaporator. These units are not as efficient as low pressure units, but have certain advantages in contaminated harbors. Higher pressures bring about higher temperatures which kill off bacteria, etc.

Other methods of converting salt water to fresh water are the chemical method and the freezing method.

Also, many survivors of lost ships have told stories of obtaining fresh water from fish, birds, rain water and icebergs.

Westinghouse Award Received by Fisher

A. M. Fisher, northwestern district industrial department manager for Westinghouse Electric Corporation, was awarded the Order of Merit, his firm's highest honor for "distinguished service and outstanding leadership," in Chicago on May 4.

The award was presented to Mr. Fisher before Chicago employees and executives of Westinghouse by Fred T. Whiting, a former Western Society trustee, and vice president in charge of the District.

The Order of Merit, consisting of a bronze medal and certificate, is bestowed by the Board of Directors of Westinghouse.

Mr. Fisher has been with Westing-

A. M. Fisher, right, receives Westinghouse Electric Corporation's Order of Merit. This is Westinghouse's highest award. Fred T. Whiting, left, former Western Society trustee, presented the award.

house during all of the twenty-four years of his business career.

He was born March 23, 1908, and spent his early life in the small South Dakota town of Parker. He attended South Dakota State College and the University of Minnesota, where he was a letterman in baseball and basketball, and received his electrical engineering degree from the latter institution in 1929.

At that time he joined the Westinghouse graduate student training course and spent one year in various plants of the firm and another year with headquarters sales in Pittsburgh, Pa.

Mr. Fisher was then assigned to the Chicago office of Westinghouse as a sales engineer. In 1938 he was transferred to the Milwaukee branch office and three years later was appointed its manager.

He was promoted in 1949 to manager of the District's important industrial department in Chicago.

In 1950 Mr. Fisher attended the advanced management program of Harvard University.

Crystal Gazing Job Called Important One

Crystal gazing is an important occupation at the Engineer Research and Development Laboratories, Fort Belvoir, Virginia, especially when it has to do with snow crystals. A new device, tentatively called a crystal camera, was designed recently by Eugene T. Chapman of the Technical Photographic Branch, for a project in the arctic being studied by ERDL's Roads and Airfields Branch.

The camera was designed to magnify snow crystals to three diameters and photograph them for investigation purposes. Study of the crystals will indicate the compaction characteristics of snow. Also being studied is the possibility of processing crystals to make them adhere.

The crystal camera is pre-set and contains its own light source. Shutter speed is set at 1/10 of a second and the lens is set at F:11. It is operated by a 6-volt motor vehicle battery. The camera is composed of standard camera parts and although pre-set, magnification can be altered to as much as 11 diameters.

The principle which allows the photographing of crystals before the internal light source can melt them, is responsible for causing the crystals to glow rather than reflect or transmit light.

The pilot model of the crystal camera is presently being demonstrated and tested in Canada.

Crerar Library News and Notes

The number of current periodicals in the field of engineering and related subjects available on open shelves in the Technology Department has been increased by some 384 titles, made possible by remodelling the large floor cases in the Technology Department Reading Room. This is the latest of a number of steps taken during the past couple of years to make the most important technical periodicals easily accessible to the Library's readers.

* * *

Crerar Library is one of the institutions in Chicago which is sponsoring the current efforts of the Chicago Educational Television Association to raise funds to establish and maintain a television station for Channel 11. Mr. Edward L. Ryerson and Dr. John T. Rettaliata, President and First Vice-President, respectively, of Crerar are directors of the new association and Herman H. Henkle, Librarian, is a member of the Advisory Committee.

* * *

It is the policy of Crerar to send various members of its staff as representatives to the important professional meetings of the several national library associations. Mr. William S. Budington, Associate Librarian, will attend the Conference of the Special Libraries Association in Toronto, Canada in June and will also attend the Annual Meeting of the American Society for Engineering Education in Gainesville, Florida. Miss Viola Gustafson, Assistant Librarian, will represent Crerar at meetings of the Association of Research Libraries and the American Library Association to be held the latter part of June in Los Angeles. Miss Hazel Keener, Assistant Chief of the Technology Department, will also attend the meeting of Special Libraries in Toronto and Miss Elizabeth Kientzle, Gifts and Exchange Librarian, will attend the meeting of the American Library Association. With financial assistance from the Chicago Medical Society, the Illinois Medical Society, the Institute of Medicine of Chicago and the International College of Surgeons, the Library is able to send Miss Ella M. Salmonsen, Chief of the Medical Department, to represent Crerar at the First International Congress on Medical Librarianship to be held in London in July. Professional meetings attended by the Librarian include the Lexington Group (devoted to study of the history of railroads) and a Conference on Procedures for Organizing Information sponsored by the Armed Services Technical Information Agency.

GILBERT-HODGMAN, INC.

Electrical Engineers and Contractors

327 SOUTH LASALLE STREET

CHICAGO 4, ILLINOIS

Members W.S.E.—A.I.E.E. HArrison 7-8774

The WSE Bar **will remain open all through the summer. Come in, relax, and enjoy yourself.**

Obituaries

The Western Society of Engineers has recently been notified of the following deaths.

Julius F. Werlich, the Western Society has just been informed, died in October, 1952, at the age of 84. Mr. Werlich, a life member, had belonged to the Society since 1909. He had made his home in River Forest, Illinois.

Edward P. Roe, an affiliate member of the Western Society, died on December 20, 1952, at the age of 57. Mr. Roe had been elected to the Western Society in 1949. He had been employed at Universal-Atlas Cement Company, since 1926, in the Loop sales department.

Edward F. Steuben died February 27, 1953 at the age of 53. Mr. Steuben, elected to membership in the Western Society in 1951, had been Chief Specifications Engineer for the Chicago Housing Authority.

Reginald N. Wade, a member of the Western Society since 1924, died on March 13, 1953. Mr. Wade was retired at the time of his death. Memorial services were held for him in Wilmette, Illinois, and final services at the cemetery in Batavia.

Thomas J. Lucas, elected to membership in the Western Society in 1928, died on March 17, 1953. Mr. Lucas had been a partner in the firm of Lucas and Luick, in Wilmette, Illinois.

THE MONADNOCK
53 West Jackson Blvd.

LONG RECOGNIZED AS
Headquarters for Office Space
FOR
Engineers
Architects
Patent Attorneys
Manufacturers' Representatives

ALDIS & COMPANY Management

The Whole Loop at its Doorstep

Purchasing Course to be Offered by I.I.T.

A new management curriculum for the professional education of purchasing executives was announced May 5 by Dr. Pearce Davis, director of the Department of Business and Economics at Illinois Institute of Technology.

The new Purchasing program, which will be initiated at Illinois Tech in September, was developed in cooperation with the Purchasing Agents Association of Chicago, an affiliate of the National Association of Purchasing Agents.

This curriculum, Davis said, will be a pioneering educational program. Up to now, he explained, American colleges and universities have offered relatively little specialized training in this important field.

The program in Purchasing will be a four-year course of study offered by the I.I.T. Department of Business and Economics and will lead to the degree of Bachelor of Science. A major addition to the school's already extensive curricula in management, the program represents what professional purchasing agents think should be offered by colleges and what the educators themselves think.

Impetus for development of the new curriculum was given by a recent comprehensive survey conducted by the Purchasing Agents Association of Chicago. This group surveyed its membership of 1,100 purchasing agents in the Chicago area on the subject, "What purchasing agents expect from colleges." The Association also desired to give some financial assistance and support to schools that would help serve the demand for trained personnel in this field.

To encourage development of the new curriculum at I.I.T., the Purchasing Agents Association has established two four-year full-tuition scholarships to be awarded on a competitive basis to students interested in this field. These scholarships will be available for the academic year beginning in September. They will be awarded by a joint committee of the Chicago Association and Illinois Tech.

The Purchasing program will be composed of two basic parts: (1) a foundation of general education; and (2) specialized training in purchasing and related management subjects. During his four years of study, a student in the program will take courses in purchasing, accounting, marketing and sales, human relations, management policy, business law, statistics, public speaking, industrial processes, and money, banking, and business cycles.

Courses in the Purchasing program will be available in both day and evening divisions of Illinois Tech.

Detailed information concerning the new Purchasing curriculum and the scholarships may be obtained from Dr. Pearce Davis, Director of Business and Economics, Illinois Institute of Technology, Chicago 16.

Subject of Lecture Is Micrometallurgy

Mr. Jerome Strauss, Vice-President, Vanadium Corporation of America, New York, will present the second H. W. Gillett Memorial Lecture. Mr. Strauss has selected the subject "Micrometalurgy."

This lecture—first presented at the Fiftieth Anniversary Meeting of the ASTM—is jointly sponsored by the American Society for Testing Materials and Battelle Memorial Institute. It commemorates Horace W. Gillett, one of America's leading technologists and metallurgists and the first Director of Battelle. Each year it will cover subjects pertaining to the development, testing, evaluation, and application of metals.

The 1953 ASTM Annual Meeting will be held in Atlantic City during the period June 29 through July 3, and on Tuesday afternoon, June 30, Mr. Strauss will deliver the H. W. Gillett Lecture. The 1953 lecture will involve the significance and effect of very small and in some cases minute quantities of elements on various metals and alloys. Fractions of a per cent of some elements have an important bearing on the use of alloys—frequently beneficial, occasionally deleterious.

WSE Applications

In accordance with the By-Laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office. The Secretary's office is located at 84 East Randolph Street. The telephone number is RAndolph 6-1736.

125-52 Joseph W. Myers, Consultant Industrial Engr., Martin-Parry Corp., 1455 Alexis Rd., Toledo, Ohio.

126-52 Donald C. Anderson, Engineer, Illinois Bell Telephone Co., 212 W. Washington St.

127-52 Carl B. Olson, 3818 N. Hoyne Av.,—attending Illinois Institute of Technology.

128-52 Thomas F. Curran, 6049 S. Talman Av.,—attending Illinois Institute of Technology.

129-52 Milton J. Steinbraker, Staff Assistant, Public Service Company of Northern Illinois, 72 W. Adams St.

130-52 Merrill J. Sweney, President & Treasurer, Sweney Electric Co., Inc., 2777 W. 11th Av., Gary, Ind.

131-52 Robert E. Walton, Vice Pres. & Chief Elect. Engr., Sweney Electric Co., Inc., 2777 W. 11th Av., Gary, Ind.

132-52 Bernard R. Juskie, 3916 W. 57th Place—attending Missouri School of Mines.

133-52 William J. Lytle, Superintendent, W. E. O'Neil Construction Co., 2751 Clybourn Av.

134-52 Sigurd O. Johnson, Partner; Trumbo, Johnson & Heckel, 20 N. Wacker Dr.

135-52 C. Sidney Jones, Instructor of Elect., Board of Education of the City of Chicago, Chicago Vocation School, 2100 E. 87th St.

136-52 Howard J. Pratt, Plant Appraisals Engr., Illinois Bell Telephone Co., 212 W. Washington St.

137-52 Charles B. Doolittle, Division Plant Engr., Illinois Bell Telephone Co., 212 W. Washington St.

138-52 I. W. Parrish, Jr., President, St. Anne Farm Drainage Co., Inc., St. Anne, Ill.

139-52 Theo. L. Dahlberg, Chief Engineer, Deady Chemical Co., 53 W. Jackson Blvd.

140-52 Ira H. Coyne, President, Federal Engineering Co., 703 Putnam Bldg., Davenport, Ia.

141-52 William R. Scherwat, 1107 W. Green St., Urbana, Ill.—attending University of Illinois.

142-52 Louis A. Bracich, Tool Engineering, Askania Regulator Co., 1104 S. Wabash Av.

143-52 Arthur R. Gershon, Production Engineer, Askania Regulator Co., 1104 S. Wabash Av.

144-52 S. W. Fountain, Vice President, Chicago Tramrail Corp., 4000 W. Washington Blvd.

145-52 William Littell Everett, Dean of Engineering, University of Illinois, Urbana, Ill.

146-52 Gordon Charles Meyers, Assistant Engineer, Teletype Corporation, 1400 W. Wrightwood.

I.T.T. Will Be Host for Hydraulics Meet

Illinois Institute of Technology will be host to the Ninth National Conference on Industrial Hydraulics October 8-9 at the Hotel Sheraton in Chicago.

Conference director will be O. E. Teichmann, assistant chairman of the Heat-Power department at Armour Research Foundation of Illinois Institute of Technology. Carl E. Schmitz, WSE, vice president of the Crane Packing Co., will be associate director.

John G. Duba, WSE, and assistant professor of civil engineering at Illinois Tech, Conference secretary, announced that the following committee members will assist Teichmann and Schmitz:

C. J. Clark, manager, Pump and Condenser division, Ingersoll-Rand Co.; C. L. Conroy, president, Anchor Coupling Co.; F. W. Edwards, WSE, director, department of civil engineering, Illinois Institute of Technology; J. T. Greenlee, vice-president, Imperial Brass Mfg. Co.; W. S. Hamilton, associate professor of civil engineering, Northwestern University; R. O. Isenbarger, chief engineer, Chicago Rawhide Mfg. Co.

(Continued on Page 24)

READY COAL & CONSTRUCTION COMPANY

- HEAVY CONCRETE CONSTRUCTION
- RAILROAD FACILITIES
- BRIDGES
- PAVING
- GRADING
- SEWERS

BOULEVARD 8-4311
4911 SO. SHIELDS AVE.
CHICAGO 9, ILLINOIS

GREELEY AND HANSEN
ENGINEERS

Samuel A. Greeley Kenneth V. Hill
Paul E. Langdon Samuel M. Clarke
Thomas M. Niles Paul Hansen (1920-1944)

Water Supply, Water Purification
Sewerage, Sewage Treatment
Flood Control, Drainage, Refuse Disposal
220 S. STATE STREET, CHICAGO 4

Alvord, Burdick & Howson

ENGINEERS FOR

Water Works, Water Purification, Flood Relief.
Sewerage, Sewage Disposal, Drainage,
Appraisals, Power Generation

20 N. Wacker Drive · Chicago 6

Telephone: CEntral 6—9147

Rogers Park 4-1295
GReenleaf 5-6960

CONTRACTING
AND
MATERIAL CO.
Engineers &
Contractors
EVANSTON, ILLINOIS
1235 Dodge Avenue

RELIABLE
Contracting and
Equipment Company
GENERAL CONTRACTORS
Specializing in
Underground Construction
100 N. LASALLE CEntral 6-1816

GRIFFENHAGEN
& ASSOCIATES
Consultants in Management
since 1911

CHICAGO
333 N. Michigan Avenue
RAndolph 6-3686

NEW YORK • BOSTON • WASHINGTON
MILWAUKEE • LOS ANGELES

(Continued from Page 23)

Also, R. J. King, supervising engineer, research department, Caterpillar Tractor Co.; Clark Langworth, district manager, Vickers, Inc.; C. J. McLean, WSE, general hydraulic engineer, Public Service Company of Northern Illinois; J. T. Marshall, chief engineer, pump division, Bendix products division, Bendix Aviation Corp.; R. E. Peck, professor of chemical engineering, Illinois Institute of Technology.

Also, J. J. Slomer, hydraulic engineer, Goodman Manufacturing Co.; V. L. Streeter, research professor of mechanics and director, fundamental fluids research, Ilinois Institute of Technology; J. C. Van Gundy, assistant technologist, technical and research division, the Texas Co.; W. W. Weltmer, hydraulic engineer, Allis-Chalmers Manufacturing Co.; Ernst Wiedmann, chief engineer, the Oilgear Co.; and J. F. Ziskal, chief engineer, International Harvester Co., farm tractor division.

Societies that help IIT stage the conference each year include:

The Illinois section of the American Society of Civil Engineers, Chicago section of the American Society of Mechanical Engineers, Chicago section of the Society of Automotive Engineers, Western Society of Engineers, American Society of Lubrication Engineers, Chicago section of the American Institute of Chemical Engineers, Chicago section of the Institute of Aeronautical Science, American Society of Agricultural Engineers, Chicago chapter of the Illinois Society of Professional Engineers, and the Chicago chapter of the American Society of Tool Engineers.

WSE Personals

John H. Duescher, formerly with Vapor Heating Corporation, is now Project Engineer, Diaphlex Division, Cook Electric Company in Chicago.

Conrad Wieler is now with the Pearson Industries Steel Treating Company in Chicago. Previously Mr. Wieler had been a designer with Verson Allsteel Press Company.

Edgar F. Copell has joined the consulting engineering organization of DeLeuw, Cather and Company as Chief Engineer of the New England section. Offices have been established at 345 Boylston Street, Brookline, Massachuetts. Mr. Copell, until recently, was Commissioner of the Metropolitan District Commission with offices in Boston. He has been associated with the Commonwealth of Massachusetts for 30 years.

Dr. J. Bjorksten, MWSE, President of the Bjorksten Research Foundation, announces that this summer Dr. Willis A. Gortner, Head of the Chemistry Department of the Pineapple Research Institute, Honolulu, Hawaii, plans to spend three months of his sabbatical leave in the laboratories of the Bjorksten Research Foundation. Dr. Gortner will be working on problems related to the Fundamental Chemistry of Aging, in conjunction with a program carried on at the Foundation.

(Continued on Page 26)

WM. E. SCHWEITZER & CO.
General Contractors
2207 Dodge Avenue
EVANSTON, ILLINOIS
AMbassador 2-3489 GReenleaf 5-4414
☆ ☆ ☆
Contractors for Industrial Construction

Engineering Societies Personnel Service, Inc.

New York Chicago Detroit San Francisco

84 East Randolph St., Chicago 1, Ill., ST ate 2-2748

These items are from information furnished by the Engineering Societies Personnel Service, Inc., Chicago. This SERVICE, operated on a co-operative, non-profit basis, is sponsored by the Western Society of Engineers and the national societies of Civil, Electrical, Mechanical and Mining and Metallurgical Engineers. Apply to ESPS, Chicago and the key number indicated. Prepared ENGINEERS AVAILABLE advertisements limited to 40 words, with typed resume attached may be submitted to ESPS Chicago by members of Western Society of Engineers at no charge.

OVER THE MANAGER'S DESK

As June comes upon us, we automatically think of "June Brides," and of course the forgotten bridegroom who is rather necessary for the bride, and of June graduates. In both cases, it means starting a new career with a great deal of hope and optimism and even enthusiasm.

Can you look upon the career of your engineering department, or upon your own career for that matter, with hope, optimism, and enthusiasm? Are you satisfied that the accomplishments obtained have been made in a 'Magna Cum Laude' manner? If not, get in touch with us at E.S.P.S. and see if we can help you.

B.H.A.

POSITIONS AVAILABLE

T-9757 SANITARY AND STRUCTURAL ENGR. B. S. in eng. Age: 35-50. At least 10 yrs. exp. sewer systems, sewerage treatment, water supply, treatment, distribution, personnel supervisory exp. Must be licensed struct. engr. in State of Ill. Actual duties: be in complete charge of sanitary dept. Salary: $10,000-$15,000. Loc: Illinois.

T-9939 RECENT GRADUATE—Chem. M. E. Pet. Geo. Physicist, Mining. Recent graduates or better. Single men. Age: 22-30. Duties: work on mud logging units in the oil fields. Moving expenses paid. Training spots leading to petroleum engineering. For an oil well testing company. Salary: $365 per month. Location: Texas.

R-9835 SALES Age: up to 50. 2 plus yrs. exp. in sales of constr. materials or material handling accessories. Know: structural steel, electrical structures or mechanical structures. Duties: selling or contacting arch., engrs., contractors, or industrials for line of metal framing. For Mfr. of metal frames. Sal: $400-$600/mo. Loc: Several open. Employer will negotiate fee. Car Req'd.

T-9413 POWER PLANT SUPT. ME. or EE. Age: 40 and up. 5 yrs. plus exp. in supervision capacity in power plant. Knowledge of modern boilers, turbines and aux. equip. Duties: supervise operations and maintenance in 10,000 KW steam turbo electric plant. For a public utility. Salary: up to $7200 per yr. Employer will negotiate fee. Loc: Illinois.

T-9926 CHEMIST, BS. to PhD. Men who have had graduate work in field of resins, paints, lacquers, cellulose, starch and related high polymers. Work exp. in these fields particularly desirable. Up to $800 per month. Location: Michigan.

R-9925 PROJECT ENGINEER, ME Age: up to 45. 3 plus yrs. exp. in project work fast moving machinery such as packaging or paper folding equipment. Knowledge of printing helpful. Duties: Project work in maintenance, design and installation of very fast moving, light automatic machinery. For a manufacturer. Sal: up to $170 per week. Employer will negotiate fee. Location: Chicago.

R-9923 SALES ME Chem. Eng. or Pet. Eng. Age: up to 32. 2 years plus experience in sales work either industrials or automotive fields. Duties: sell petroleum products to large trucking companies and fleet owners. Salary: $440 to $450 per mo. Car furnished. Location: Chicago.

R-9922 METALLURGIST. — Met. or Met. Eng. Recent Grad. or better. Duties: ferrous and non-ferrous controls, process development and handling field complaints on tractors and Diesel engines. For a manufacturer. Salary: up to $385 per mo. depending on exp. Employer will negotiate fee. Location: Western Chicago suburb.

T-9921 INDUSTRIAL CHEMICAL SALES. BS in Chem. Eng. or BS in Chem. Heavy on Organic. 3 yrs. sales of industrial or fine chemicals or 6 yrs. production work in industrial or fine chemicals with chemical research. Sales aptitude or 4 years exp. with sales aptitude. Sale of industrial and fine organic chemicals also new product information seeking in chemical lines. To start (after training) in Jersey-Manhattan area. Salary: $450-$550. start. Loc: East preferably.

If placed in a position as a result of an Engineers Available or Position Available advertisement, applicants agree to pay the established placement fee. These rates are available on request and are sufficient to maintain an effective non-profit personnel service. A weekly bulletin of positions open is available to subscribers. Apply ESPS Chicago.

ENGINEERS AVAILABLE

CHIEF ENGR. 45. Two yrs. costs and design of maintenance for feed & fertilizer mfgr. Twelve yrs. supervising engrg. dept. of soap and edible products. Fifteen mos. supervising design and checking of detail drawings for tank fabricators. $9600 Midwest 627 MW.

SALES ENGR. CE. 27. Two yrs. nine mos. develop distribution and promote sales of building materials. $450 Chicago 628 MW.

SALESMAN 31. Two yrs. handle all quotations, customers problems, inside and outside calls on nonferrous castings. Two yrs. outside sales of food products. Four yrs. layout and detail conveyors and detail of sewers. $5200 Midwest 629 MW.

DESIGNER 57. Twelve yrs. draftsman doing municipal, engineering, map, public utilities, drafting and computing. $4000 Midwest 630 MW.

ASST. FACTORY MGR. ME 25. Two yrs. charge of inspection and production engineering controls. Mfr. One yr. Mech. Engr. design on constr. hoists and semi-automatic production chucks. $4700 Midwest 631 MW.

CONSULTANT CE 57. Twenty-one mos. compile data and write reports on mine, rail development and utilities. Twelve yrs. charge of design, estimate, purchase, construction of buildings. $7200 Midwest 632 MW.

SALES ENGR. ME 32. Five yrs. supervise maintenance, constr., and installation of new chemical equip. Seven mos. sales and combustion engrg. in connection with heating and ventilating contractors. $7200 United States 633 MW.

SUPT. CONSTR. 61. Eighteen yrs. checking, engineering construction, estimates, trooble shooting. Two yrs. design of mech. and elect. remodeling. $7500 Chicago 634 MW.

PLANT ENGINEER CE 31. Six yrs. Plant engr. supervising of engineers and draftsmen, contracts, process piping, mech. design, tech. writing. Nine months field engineering, drafting, and instructing college students. $9600 Midwest 644 MW.

Battey & Childs

ENGINEERS — ARCHITECTS
231 So. LaSalle Street
Chicago 4, Ill.

INDUSTRIAL PLANTS
POWER PLANTS
RAILROAD SHOPS & TERMINALS

DESIGN SUPERVISION

J. W. DURKIN
District Manager
Sangamo Electric Co.

Room 1942 Phone:
Field Bldg. ST 2-0438-9

135 South LaSalle Street
CHICAGO 3, ILLINOIS

VERN E. ALDEN CO.
Engineers

Design and Supervision
of Construction

Industrial and Chemical Plants
Steam Power Plants

33 North LaSalle St.
Chicago 2

Ventilating and
Air Conditioning

• • • •

Asbestos Pipe
and
Boiler Insulation

• • • •

JAMAR-OLMEN CO.
320 N. Harding Ave.
Chicago 24, Ill.
SAcramento 2-3070

4606-28 West 12th Place
Chicago 50, Ill.

VENTILATION THE ZACK CO. AIR CONDITIONING

BI shop 2-1533-4-5 Town Hall 3-0905

Personals

(Continued from Page 24)

Soil Testing Service, Inc., which specializes in soil borings, engineering tests on soils, and reports on foundations has recently moved to new and larger quarters at 3529 N. Cicero Avenue, Chicago 41, Illinois.

The activities of the firm are directed by **Carl A. Metz** and **John P. Gnaedinger.**

James E. Cahill, MWSE, Vice President of Great Lakes Dredge and Dock Company, was honored at a luncheon on May 1 by a group of officers and employees of the company. Cahill had started work 50 years ago to the day as a civil engineer with the immediate predecessor company of Great Lakes Dredge. He has been a vice president since 1934.

During the 50 years Cahill has worked in various capacities, including field supervision and management of construction contracts totaling an estimated $100,000,000. Some of the more important projects included the North Michigan Avenue Improvement, Ogden Avenue, Damen Avenue and Outer Drive Extension, and Lincoln Park Extension.

Cahill has several U.S. patents granted and pending on marine construction improvements.

During World War II, he served as Management Representative on the Appeals Panel of the Chicago Labor-Management Committee of the War Manpower Commission.

Ovid W. Eshbach, past president of WSE, is retiring from the post of dean of Northwestern University's Technological Institute in order to devote his time to

James E. Cahill

teaching. Eshbach has held that position since its establishment in 1939.

Donald H. Loughridge, nationally know physicist and the Atomic Energy Commission's present assistant director for reactor development, has been named to take over as dean.

The announcement was made by Dr. J. Roscoe Miller, Northwestern president, who said Loughridge would assume his new post on July 1.

Loughridge joined the AEC in 1951 after three years of service as senior scientific adviser to the secretary of the army. His work with the AEC has been concerned with the problems of engineering as well as related basic sciences.

Loughridge received both his graduate and undergraduate training at the California Institute of Technology.

First C. S. I. Dinner Set for June Ninth

The First Annual Dinner Meeting and Election of Officers of the Chicago Chapter of the Construction Specifications Institute was scheduled for Tuesday, June 9, at the Chicago Engineers' Club in Chicago.

Roy G. Christienson, the speaker, is Building Commissioner, City of Chicago. "Specification Writing and its Relation to the Building Code" is given as his subject.

Invited to attend were architects, engineers and producers of construction materials and equipment. Those unable to attend the dinner were invited to arrive at 7:45 p.m., to hear the speaker.

AEC Authentic APPRAISALS
for INSURANCE, ACCOUNTING, FINANCIAL, TAX AND ALL OTHER ADMINISTRATIVE PURPOSES
APPRAISAL ENGINEERING CORPORATION
3855 N. ASHLAND AVE., CHICAGO 13, ILL.
WEllington 5-1112
BACKED BY MORE THAN FORTY YEARS' EXPERIENCE

Reviews of Technical Books

Engineering Drawing

A Manual of Engineering Drawing, by Thomas E. French and Charles J. Vierck, McGraw-Hill Book Co., Inc., New York 18, N. Y. Eighth Edition, 1953. 715 pages. $8.00.

This classic text in engineering drawing was published first in 1911 under the authorship of Professor French. Since his death a few years ago, Professor Vierck has ably revised the book with the assistance of several colleagues at the Ohio State University.

The book has been revised to conform to the latest standards, chapters have been rearranged for more logical reference, many parts of the book have been rewritten, and many new drawings have been added.

New material includes practically a new chapter on orthographic reading, rewritten material on screw threads and fasteners including the new unified screw threads, a new treatment of keys, rivets, and springs, new material on welding, and virtually a new chapter on architectural drawing.

This new revision will continue to merit the wide approval that has been given to the book throughout its long use in schools and industry.

H.C.S., W.S.E.

Strength of Materials

History of Strength of Materials, by Stephen P. Timoshenko, McGraw-Hill Book Company, New York 18, N. Y. First Edition, 1953. 452 pages. $10.00.

Professor Timoshenko, in this his latest book, presents an interesting and stimulating account of the development of the science of strength of materials from earliest times. Depending on one's point of view, history may or may not be a dull subject, however, anyone even slightly familiar with strength of materials will be fascinated by this book, which is written in an unpretentious and entertaining style.

A brief biography of each investigator, beginning with Leonardo da Vinci and Galileo, is followed by an account and evaluation of his work on strength of materials. Professor Timoshenko points out that Leonardo da Vinci probably made the first attempt to apply statics to the problem of finding the forces in structural members. He also conducted experiments for determining the strength of structural materials. The history of mechanics of elastic bodies may be said to begin with Galileo who in 1638 speculated on the problem of simple bending and arrived at a number of valid conclusions. However, he failed to obtain the correct stress distribution over the cross section. As further progress in the theory of bending is traced, the names of Bernoulli, Euler and others appear. The nature of the stress distribution over the cross section and the location of the neutral axis for a long time were not understood and even Euler did not observe that the dimensions of the flexural rigidity factor are those of a force multiplied by the square of a length until 1757. Following Galileo's time a number of faltering attempts were made to clear up the theory of simple bending. In 1713 Parent completely solved the statistical problem of bending of beams, but his results were unknown to his contemporaries since he published them in his own journal. Finally Coulomb in 1773 correctly solved the problem of simple bending, apparently without knowledge of Parent's work. Coulomb also observed many physical properties of materials and concluded that the modulus of elasticity was independent of heat treatment whereas the elastic limit could be increased by quenching. Present day engineers remember Coulomb for his torsion experiments which are familiar to every college physics student.

Professor Timoshenko elaborates on many of the problems of strength of materials and elasticity along lines similar to those followed in discussing the beam problem. For instance, his discussion of the work of St. Vincent shows how a practical engineer's philosophy and an acute mathematical mind were combined to solve many important problems in elasticity. The development of experimental methods for evaluating the structural properties of materials also are traced from the time of Robert Hooke.

It is impossible to do justice in a few paragraphs to a book of 450 pages for which no doubt the author has been assembling material for years. The fundamentals of the subjects are presented with just enough analysis to make the book also very useful for orientation purposes.

This reviewer derived many hours of pleasure from reading Professor Timoshenko's book and highly recommends it to all engineers.

K.E.B.

Valuation

Engineering Valuation and Depreciation, by Anson Marston, Robley Winfrey, and Jean C. Hempstead, McGraw-Hill Book Company, New York 18, N. Y. Second Edition, 1953. 508 pages. $8.00.

This book is a major revision of an earlier book. *Engineering Valuation* by Marston and Agg (1936). While this revision contains all the major subject material of the earlier volume, it has been totally rewritten, reorganized, and brought up to date.

The coverage is broad. The book deals with concepts and procedures involved in the appraisal of industrial, commercial, utility and natural resource properties. A new chapter on the rate of return has been added.

This book is designed primarily for use as a text in schools of engineering and business where courses in the valuation of property are offered.

G.J.M.

ESTABLISHED 1913

WALTER H. FLOOD & CO.

CHEMICAL ENGINEERS

Inspection and Testing
Of Materials and Structures
Buildings, Roads, Streets, Airports
SUPERVISION OF CONSTRUCTION
CONCRETE CORE CUTTING
6102 S. BLACKSTONE AVE. CHICAGO 37
Branch—1332-4 N. Westnedge Ave.
Kalamazoo 53, Mich.

SARGENT & LUNDY

ENGINEERS

140 S. DEARBORN STREET

CHICAGO, ILLINOIS

Western Ventilating & Engineering Company

Air Conditioning
& Ventilation Contractors
Power Press Forming — Rolling — Shearing — Sawing — Arc, Gas & Spot Welding, 10 Gauge and Lighter Steel — Fabrication and Installation
1019 West Grand Ave.
Chicago 22, Ill.
PHONE CH 3-3434-5

E. R. GRITSCHKE
and
ASSOCIATES

Consulting Engineers
Designers of
MECHANICAL and ELECTRICAL SYSTEMS
for BUILDINGS

11 S. LaSalle St., Chicago 3, Ill.

ROBERT W. HUNT COMPANY
ENGINEERS

Inspection • Tests
Consultation
•
Engineering Materials
•
Cement • Concrete • Chemical
Physical and Metallurgical
Laboratories

175 W. Jackson Blvd., CHICAGO, *And All Large Cities*

Freyn Engineering Dept.
Koppers Co., Inc.
Established 1914
CONSULTING ENGINEERS
for
Blast Furnaces—Steel Works—
Industrial Plants
Industrial Power Generation and Use
Designs and Supervision of Construction
109 North Wabash Avenue
CHICAGO 2
Technical and Financial Reports
Surveys—Appraisals

THE
HAINES
COMPANY

Ventilation &
Air Conditioning Contractors
Sheet Metal Fabricators
— Welding —
1931 WEST LAKE STREET
CHICAGO 12, ILLINOIS
SE eley 3—2765

Index of MIDWEST ENGINEER *Advertisers*

Alden, Vern E. 26
Aldis & Co. 22
Alvord, Burdick & Howson 24
Appraisal Engineering Corp. 26
Battey & Childs 26
Bell Lumber and Pole Co. 17
Berthold Electric Co. 15
Clay Products Assn. 13
Commonwealth Edison ..... Cover IV
Contracting & Material Co. 24
Durkin, J. W. 26
Federal Pipe & Supply Co. 9
Flood, Walter H. & Co. 28
Freyn Engineering Dept. 28
General Electric Co. 5
Gilbert-Hodgman, Inc. 21
Greeley & Hansen 24
Griffenhagen & Associates 24
Gritschke, E. R. 28
Haines Company 28
Hunt, Robert W. 28
Jamar-Olmen Co. 26
Morrison Construction Co. 13
Ready Coal & Construction Co. 23
Reliable Contracting & Equipment Co. 24
Sargent & Lundy 28
Schweitzer, Wm. E. & Co. 24
Western Ventilating & Engineering Co. 28
Zack Company 26

Help the Society help you!

Keep it posted on changes in your status

To make sure we have you listed correctly,

MAIL FORM TO THE WESTERN SOCIETY OF ENGINEERS
84 E. Randolph St., Chicago 1, Ill.

Name: .....

Position: .....

Firm: .....

Firm Address: .....

Home Address: .....

Home Phone: ..... Business Phone: .....

.24
.24
.28
.28
.28
.26
.13
.23

.24
.28
.24

.28
.26

48

6

953

Here's what happens to the blood you give to the NATIONAL BLOOD PROGRAM *THROUGH your Chicago Chapter American Red Cross*

THIS IS WHY BLOOD IS AMERICA'S MOST PRECIOUS NATIONAL RESOURCE

WHOLE BLOOD—The acme of therapy: replenishes body's oxygen supply; combats shock; can be preserved 21 days under refrigeration.

BLOOD PLASMA—Combats shock; can be preserved five years.

SERUM ALBUMIN—Combats shock; can be preserved five years.

GAMMA GLOBULIN—Effective in minimizing polio paralysis; preventing measles; used to treat infectious hepatitis; can be preserved one year.

Prepared by—Public Information Department
Chicago Chapter, The American Red Cross

OUR "TWO CENTS' WORTH"

That's right, Madam, 2¢ worth of electricity —your biggest household bargain—keeps food safe in the refrigerator for about 16 hours!

The more work-saving, pleasure-giving electrical appliances and modern lighting you use, the less your average cost per kilowatt hour. Electricity is a bargain — use it to lighten household work and to make things more pleasant around your home. Your best buy is still — our two cents' worth!

In Chicago and Northern Illinois, electricity is your biggest household bargain.

COMMONWEALTH EDISON COMPANY

PUBLIC SERVICE COMPANY
OF NORTHERN ILLINOIS